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The Professional in Emergency Management Independent Study Course

Developed For:
Federal Emergency Management Agency
National Emergency Training Center
Emergency Management Institute

TABLE OF CONTENTS

Page

Introduction i

I. The FEMA Organization

General Information I-1
Federal Emergency Management Agency I-3
The Stafford Act I-16
Government Response to a Disaster Declaration I-26
The Disaster Field Office I-41
Disaster Assistance Programs I-47

II. Planning for and Identifying Community Hazards

Hazardous Weather Fact Sheets II-1
Thunderstorms II-2
Tornadoes II-8
Flash Floods II-14
Riverine Floods II-19
Coastal Floods II-24
Extratropical Cyclones II-32
Tropical Cyclones II-34
Winter Storms II-43
Excessive Cold II-50
Fog II-54
Excessive Heat II-59
Duststorms II-63
Windstorms II-67
Fire Weather II-71
Other Hazards II-75
Earthquakes II-76
Tsunamis II-79
Terrorist Threats II-84

FOREWORD

This course is for any professional in emergency management or anyone who is looking for a career in the profession. You could be asked to respond to questions about hazards that you may not normally encounter and about national level activities outside your community. People expect that capability of professionals.

There are two parts to this book. One part is an orientation to the national assets coordinated by FEMA and the Federal role in disaster management. The other part is devoted to increasing our knowledge of a wider range of hazards. We have joined these two different topics in one book because they represent the broader field of emergency management. If you widen your professional outlook, you may become a more versatile emergency manager. You will be better able to coordinate outside your jurisdiction and to apply your skills to hazards and circumstances in any part of the country.

You are part of a profession that needs people who are flexible, resourceful, and have wide-ranging knowledge and experience. Professionals in emergency management have found employment in agencies and organizations not just in their home communities but throughout this country. They are competent not only with their own jurisdiction's hazards and local responsibilities, but they are also knowledgeable about many hazards and national level responsibilities. By acquiring this broader background in the profession, you may bring new ideas and innovations to your community and its neighbors, and may contribute at the State, national, and international levels as well.

INTRODUCTION

PURPOSE

As a State or local emergency management official, it is your responsibility to know which specific hazards your community faces and be able to identify public safety issues when hazards threaten. Your primary concern in the event of an emergency is to warn citizens and take whatever actions are needed to protect life and property and minimize damage.

Working independently through this course, you will learn about the role of the Federal Emergency Management Agency (FEMA), the types of damage that specific natural and manmade hazards can cause, and how–and under what circumstances–FEMA can help. Through reading assignments and exercises, you will be better prepared to apply the fundamentals of disaster response and recovery for the hazards that affect your community.

How To Complete This Course

This course is designed for self-study. The course includes two sections:

- **The FEMA Organization.** This section provides background information to help you understand FEMA's mission and operations.
- **Planning For and Identifying Community Hazards.** This section discusses specific hazards.

Throughout the course, you will be asked to read some information and then apply what you learned in a series of exercises. Additionally, you will be quizzed on your understanding of the material. Upon completion of the course, you will be required to take a final examination.

Work through this course at a pace that is comfortable for you. Take enough time to ensure that you have mastered the content before proceeding. Pay special attention to the areas where your community is most vulnerable.

At the end of the course is a final exam that will help you evaluate how much you've learned during the course. Although the final exam is not graded, it is recommended that you take the exam as a self-evaluation.

COURSE OBJECTIVES

When you complete this course, you should be able to:

- Identify the types of hazards for which your community is at greatest risk.
- Identify the types of damage that are likely from high-risk hazards to your community.
- Identify the types of assistance that FEMA can provide and the steps required to request FEMA assistance

PRE-COURSE TEST

Instructions: This test will help you to determine topics in the course with which you are familiar—and those that you must pay careful attention to as you complete this Self-Instruction. When you have finished, check your answers against the Pre-Course Test Answer Key following this Pre-Course Test. Then, proceed through the course materials at a pace that is comfortable for you.

---

1. FEMA helps plan, coordinate, and manage disaster assistance activities including preparedness, response, recovery, and _____.

2. Other FEMA activities include (check all that apply):

   ☐ Planning for emergencies at the Army's chemical stockpile sites.
   ☐ Providing security at commercial nuclear powerplants.
   ☐ Providing emergency food and shelter funding for the homeless.
   ☐ Ensuring the continuity of the Federal government during national security emergencies.

3. One of FEMA's goals is to create an emergency management partnership with other Federal agencies, State and local governments, _____, and the private sector.

4. In concert with its partners, a FEMA goal is to establish a national emergency management system that is (check all that apply):

   ☐ Comprehensive.
   ☐ Risk-based.
   ☐ Locally administered.
   ☐ All-hazards in approach.

5. FEMA (check all that apply):

   ☐ Coordinates aid for State emergencies.
   ☐ Staffs the Emergency Food and Shelter National Board.
   ☐ Administers community awareness programs for weather emergencies and home safety.
   ☐ Works to reduce the Nation's losses from fire.

6. Of the seven major FEMA program offices, the Mitigation Directorate provides:

   a. Habitability inspections of disaster-damaged homes.
   b. Local fire service planning.
   c. Flood map revision, distribution, storage, and print processing.
   d. Federal flood insurance servicing agent operation.

7. The Operations Support Directorate provides:

   a. Cost and benefit analyses.
   b. Background investigations.
   c. All-hazards public information materials.
   d. Advanced hazardous materials studies.

8. The Response and Recovery Directorate is responsible for the oversight of the Emergency Management Institute (EMI).

   ☐ True ☐ False

9. FEMA's program offices, headquartered in Washington, DC, are the primary source through which FEMA's policies, programs, and program objectives are delivered and accomplished at the Regional, State, and local levels.

   ☐ True ☐ False

10. The 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act, which provides the authority for FEMA's role in managing Federal disaster assistance:

    a. Includes programs for temporary housing, debris removal, and mitigation.
    b. Provides assistance contingent upon a Governor's disaster declaration.
    c. Authorizes funding for a single-incident response.
    d. Includes Congressional responsibility for determining when Federal disaster relief is required.

11. FEMA's role, as established by the Stafford Act, includes (check all that apply):

    ☐ Helping assess the damage after a disaster.
    ☐ Evaluating a Governor's request for a Presidential declaration.
    ☐ Managing the President's Disaster Relief Fund.
    ☐ Coordinating the activities of volunteer organizations.

12. Under the Stafford Act, a Presidential declaration can be based on either a major disaster or an emergency.

    ☐ True ☐ False

13. Local government's response to an emergency is determined by the (check all that apply):

    ☐ Speed of onset of the emergency.
    ☐ Potential need for evacuation.
    ☐ Magnitude of the situation.
    ☐ Governor's request for assistance.
    ☐ Extent of the threat to citizens.

14. In many States, the Governor can suspend local ordinances if it is determined that the law in question will restrict or prohibit efforts to relieve human suffering caused by the disaster.

    ☐ True ☐ False

15. When a State emergency is declared, the Governor can (check all that apply):

    ☐ Provide State assistance with evacuation and the control of points of entry and departure.
    ☐ Establish economic controls over resources such as food, clothing, and shelter.
    ☐ Establish control over wages in the affected area.
    ☐ Mobilize the National Guard and direct its efforts.

16. The steps involved in a Presidential declaration include (check all that apply):

    ☐ A joint FEMA/State Preliminary Damage Assessment (PDA).
    ☐ FEMA's activation of the Federal Response Plan (FRP).
    ☐ The Governor's request for assistance.
    ☐ FEMA's recommendation to the President regarding the Governor's request.
    ☐ The Presidential declaration.

17. After the President declares a major disaster, the FEMA-State Agreement is prepared by the FEMA Regional Director and the State _____.

18. The Federal Response Plan is applicable only to natural disasters such as earthquakes, typhoons, floods, and fires.

    ☐ True ☐ False

19. After a Presidential declaration of a major disaster, the Emergency Support Team (EST) is always activated at the Regional Operations Center (ROC).

    ☐ True ☐ False

20. In catastrophic situations, the Director of FEMA may deploy the National Emergency Response Team (ERT-N) to support State and FEMA Regional resources.

    ☐ True ☐ False

21. States have the right to appeal the President's denial of a request for an emergency declaration.

    ☐ True ☐ False

22. The _____, where the ERT is located, serves as the central coordinating facility for joint Federal-State operations.

23. The _____, the lead Federal official at the Disaster Field Office (DFO), works jointly with the State Coordinating Officer (SCO) to assess the most urgent needs, coordinate Federal and State efforts, and devise strategies to meet the needs.

24. The major sections of the ERT at the DFO are _____, Information and Planning, Logistics, and Administration.

25. Three key functions of the ERT are Emergency Information and Media Affairs, Congressional Affairs, and _____.

26. The Disaster Housing Program is administered and funded by:

    a. Jointly by FEMA (at 75% funding) and the State (at 25%).
    b. FEMA.
    c. The Department of Housing and Urban Development (HUD).
    d. Representatives of the Cora Brown Fund.

27. The amount of home repair assistance provided under the Disaster Housing Program is based on the damages incurred, as determined by a State inspection.

    ☐ True ☐ False

28. Transient accommodations includes rental reimbursement for:

    a. Mobile homes.
    b. Rental apartments.
    c. Travel trailers.
    d. Motels and hotels.

29. Disaster Unemployment Assistance is administered by the State and funded by FEMA.

    ☐ True ☐ False

30. Individual and Family Grants may be provided for (check all that apply):

    ☐ Medical expenses.
    ☐ Transportation expenses.
    ☐ Legal services.
    ☐ Home repair.
    ☐ Replacement of essential personal property.
    ☐ Funeral expenses.
    ☐ Tax assistance.
    ☐ Protective measures.

31. Eligibility for Economic Injury Disaster Loans is restricted to businesses located within the counties that are included in the Presidential disaster declaration.

    ☐ True ☐ False

32. Agricultural Assistance includes:

    a. Emergency debris removal on farmland within a Presidentially declared disaster area.
    b. Repair of roadways in rural areas affected by the disaster.
    c. Assistance to counties within an area included in a disaster declaration by the Secretary of Agriculture.
    d. Provision of Federally-owned feed grain for livestock and herd preservation.

33. Eligible applicants for infrastructure support assistance within designated disaster areas include (check all that apply):

    ☐ States.
    ☐ Native American tribes or authorized tribal organizations.
    ☐ Eligible small businesses.
    ☐ Alaska Native villages and organizations.
    ☐ Voluntary agencies.
    ☐ Essential private-sector properties.
    ☐ Qualifying private nonprofit organizations.

34. Mitigation actions are accomplished by (check all that apply):

    ☐ Acting on the hazard.
    ☐ Redirecting the hazard.
    ☐ Interacting with the hazard.
    ☐ Avoiding the hazard.

35. Flood Mitigation Assistance (FMA) grants, made on an annual basis, can be awarded for planning assistance, implementation of actual mitigation projects, and _____.

36. The _____ provides flood insurance at a reasonable cost in exchange for the careful management of flood-prone areas by local communities.

37. Under _____, FEMA offers expertise and technical assistance from both the national and regional levels to provide local governments with information and techniques on the latest mitigation practices.

38. Even without a Presidential declaration of a major disaster or emergency, these types of assistance (among others) are available from various Federal and regional agencies (check all that apply):

    ☐ Search and rescue.
    ☐ Flood protection.
    ☐ Fire suppression assistance.
    ☐ Tax refunds.
    ☐ Voluntary organization assistance.

39. When dealing with the hazardous weather events that are common to a community, it is important to know the definition of the event, _____, and historical examples of the types and amounts of damage that each event may cause.

40. To be better prepared for your community's emergency planning process, consider which hazards are most likely to occur in your community, what damage they are likely to cause, which areas are likely to be hardest hit, and _____.

41. If a hazardous weather incident occurs, your community may require assistance from _____, the State, and FEMA.

42. _____ are the most violent storms on Earth.

43. _____ is the number one weather-related killer in the United States.

44. Fire is a hazard that is sometimes associated with thunderstorms.

    ☐ True ☐ False

45. _____ are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground.

46. A tornado that is over water is a:

    a. Frontal system.
    b. Funnel cloud.
    c. Water spout.
    d. Microburst.

47. Nearly half of the number of victims killed by flash floods are:

    a. Boaters injured in debris flows.
    b. Rescue workers caught in mudslides.
    c. Children playing near culverts and drainage pipes.
    d. Motorists trapped in their vehicles.

48. Soils covered with vegetation enhance runoff and enable the rapid accumulation of water at low points.

    ☐ True ☐ False

49. A Flash Flood Watch covers precipitation, snow/ice melt, and _____.

50. The lakeshore flooding event that is known as a _____ occurs when winds push the lake water to one end of the lake and then, when the storm ends, the water sloshes to the other end of the lake, causing water level changes of up to several feet.

51. A storm surge usually arrives as a/an:

    a. Unusual rise in the barometric pressure.
    b. Abnormal rise in the tide.
    c. Rapidly moving wall of water.
    d. Downdraft resulting in a burst of high wind.

52. A Coastal Flood Statement informs the public that coastal flooding is possible approximately 12 to 36 hours after issuance time.

    ☐ True ☐ False

53. Hurricane winds blow _____ around the center, or eye, of the storm.

54. Hydrometeorological hazards associated with hurricanes include (check all that apply):

    ☐ Coastal flooding caused by a storm surge.
    ☐ Windstorms resulting from extremely strong winds.
    ☐ Riverine flooding caused by heavy rains.
    ☐ Tornadoes.

55. Winds that extend outward from a hurricane's eye wall in the *right front quadrant* are the most devastating.

    ☐ True ☐ False

56. _____ are periods of moderate to heavy snowfall, intense, but of limited duration, accompanied by strong, gusty surface winds and possibly lightning.

57. The National Weather Service (NWS) issues this type of bulletin for winter weather situations that cause significant inconvenience but do not meet warning criteria and, if caution is not exercised, could lead to life-threatening situations.

    a. Short-term Forecast
    b. Winter Weather Advisory
    c. Special Weather Statement
    d. Winter Storm Outlook

58. A victim of hypothermia requires immediate medical help when body temperature drops to _____.

59. About five percent of winter deaths attributed to exposure to cold occur in the home.

    ☐ True ☐ False

60. _____ is defined as water droplets suspended in the air at the Earth's surface.

61. The _____ is a measure of the effect of the combination of significantly high temperatures and high humidities.

62. These problems can result from excessively high temperatures (check all that apply):

    ☐ Cramps and fainting
    ☐ Electrical brown-outs
    ☐ Changes in airplanes' performance
    ☐ Increases in the body's salt levels

63. _____ can cause impaired visibility and breathing difficulties as well as scouring damage to buildings and automobiles.

64. A term used for the meteorological conditions that promote the spread of wildfire:

    a. Fire danger
    b. Fire weather
    c. Red-flag conditions
    d. Fuel/weather factor

65. The _____ is the point on the Earth's surface directly above the focus of an earthquake—where geologists identify the earthquake's location.

66. Extremely strong earthquakes have magnitudes of _____ or more on the Richter Scale.

67. A _____ is a series of ocean waves of extremely long length, generated by disturbances from earthquakes, underwater volcanic eruptions, or landslides occurring below or near the ocean floor.

68. In the United States, most terrorist incidents have involved individuals who use terrorism to achieve a general objective.

    ☐ True ☐ False

69. Anti-terrorism research has resulted in antidotes for all known chemical terrorism agents, but not as yet for all biological agents.

    ☐ True ☐ False

70. It is possible for a civilian to order the bacteria that causes bubonic plague from a privately owned United States company.

    ☐ True ☐ False

71. The most feasible, and thus the most likely, form of nuclear terrorism in the United States is:

    a. Importation of radioactive material.
    b. Theft of radioactive sources from legitimate industry.
    c. Clandestine manufacture of plutonium.
    d. Assault on a nuclear facility.

72. For biological warfare agents, concern for person-to-person contamination is limited to pneumonic plague and _____.

73. Half of the cases of inhalation anthrax in which treatment begins after the exhibition of symptoms result in death, regardless of the treatment.

    ☐ True ☐ False

74. Vaccination of the general population against the more common biological agents is expected to lessen the threat of domestic terrorism in the United States within five years.

    ☐ True ☐ False

PRE-COURSE TEST ANSWER KEY

Instructions: Use this Answer Key to check your answers to the Pre-Course Test. If you answered any questions incorrectly, be sure to pay careful attention to those areas as you complete the course. Even if you answered all of the Pre-Course Test questions correctly, review the course materials carefully before taking the Final Examination.

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1. FEMA helps plan, coordinate, and manage disaster assistance activities including preparedness, response, recovery, and **mitigation.**

2. Other FEMA activities include (check all that apply):

   ☑ **Planning for emergencies at the Army's chemical stockpile sites.**
   ☐ Providing security at commercial nuclear powerplants.
   ☑ **Providing emergency food and shelter funding for the homeless.**
   ☑ **Ensuring the continuity of the Federal government during national security emergencies.**

3. One of FEMA's goals is to create an emergency management partnership with other Federal agencies, State and local governments, **volunteer organizations**, and the private sector.

4. In concert with its partners, a FEMA goal is to establish a national emergency management system that is (check all that apply):

   ☑ **Comprehensive.**
   ☑ **Risk-based.**
   ☐ Locally administered.
   ☑ **All-hazards in approach.**

5. FEMA (check all that apply):

   ☐ Coordinates aid for State emergencies.
   ☐ Staffs the Emergency Food and Shelter National Board.
   ☐ Administers community awareness programs for weather emergencies and home safety.
   ☑ **Works to reduce the Nation's losses from fire.**

6. Of the seven major FEMA program offices, the Mitigation Directorate provides:

   a. Habitability inspections of disaster-damaged homes.
   b. Local fire service planning.
   c. Flood map revision, distribution, storage, and print processing.
   d. Federal flood insurance servicing agent operation.

7. The Operations Support Directorate provides:

   a. Cost and benefit analyses.
   b. Background investigations.
   c. All-hazards public information materials.
   d. Advanced hazardous materials studies.

8. The Response and Recovery Directorate is responsible for the oversight of the Emergency Management Institute (EMI).

   ☐ True ☑ **False (The Preparedness, Training, and Exercises Directorate oversees EMI).**

9. FEMA's program offices, headquartered in Washington, DC, are the primary source through which FEMA's policies, programs, and program objectives are delivered and accomplished at the Regional, State, and local levels.

   ☐ True ☑ **False (The Regional Offices are the primary sources.)**

10. The 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act, which provides the authority for FEMA's role in managing Federal disaster assistance:

    a. **Includes programs for temporary housing, debris removal, and mitigation.**
    b. Provides assistance contingent upon a Governor's disaster declaration.
    c. Authorizes funding for a single-incident response.
    d. Includes Congressional responsibility for determining when Federal disaster relief is required.

11. FEMA's role, as established by the Stafford Act, includes (check all that apply):

    ☑ **Helping assess the damage after a disaster.**
    ☑ **Evaluating a Governor's request for a Presidential declaration.**
    ☑ **Managing the President's Disaster Relief Fund.**
    ☑ **Coordinating the activities of volunteer organizations.**

12. Under the Stafford Act, a Presidential declaration can be based on either a major disaster or an emergency.

    ☑ **True** ☐ False

13. Local government's response to an emergency is determined by the (check all that apply):

    ☑ **Speed of onset of the emergency.**
    ☑ **Potential need for evacuation.**
    ☑ **Magnitude of the situation.**
    ☐ Governor's request for assistance.
    ☑ **Extent of the threat to citizens.**

14. In many States, the Governor can suspend local ordinances if it is determined that the law in question will restrict or prohibit efforts to relieve human suffering caused by the disaster.

    ☑ **True** ☐ False

15. When a State emergency is declared, the Governor can (check all that apply):

    ☑ **Provide State assistance with evacuation and the control of points of entry and departure.**
    ☑ **Establish economic controls over resources such as food, clothing, and shelter.**
    ☑ **Establish control over wages in the affected area.**
    ☑ **Mobilize the National Guard and direct its efforts.**

16. The steps involved in a Presidential declaration include (check all that apply):

    ☑ **A joint FEMA/State Preliminary Damage Assessment (PDA).**
    ☐ FEMA's activation of the Federal Response Plan (FRP).
    ☑ **The Governor's request for assistance.**
    ☑ **FEMA's recommendation to the President regarding the Governor's request.**
    ☑ **The Presidential declaration.**

17. After the President declares a major disaster, the FEMA-State Agreement is prepared by the FEMA Regional Director and the State **Governor**.

18. The Federal Response Plan is applicable only to natural disasters such as earthquakes, typhoons, floods, and fires.

    ☐ True ☑ **False (The FRP is also applicable to technological emergencies.)**

19. After a Presidential declaration of a major disaster, the Emergency Support Team (EST) is always activated at the Regional Operations Center (ROC).

    ☐ True ☑ **False (The EST is activated at FEMA Headquarters.)**

20. In catastrophic situations, the Director of FEMA may deploy the National Emergency Response Team (ERT-N) to support State and FEMA Regional resources.

    ☑ **True** ☐ False

21. States have the right to appeal the President's denial of a request for an emergency declaration.

    ☑ **True** ☐ False

22. The **Disaster Field Office (DFO)**, where the ERT is located, serves as the central coordinating facility for joint Federal-State operations.

23. The **Federal Coordinating Officer (FCO)**, the lead Federal official at the Disaster Field Office (DFO), works jointly with the State Coordinating Officer (SCO) to assess the most urgent needs, coordinate Federal and State efforts, and devise strategies to meet the needs.

24. The major sections of the ERT at the DFO are **Operations**, Information and Planning, Logistics, and Administration.

25. Three key functions of the ERT are Emergency Information and Media Affairs, Congressional Affairs, and **Community Relations**.

26. The Disaster Housing Program is administered and funded by:

    a. Jointly by FEMA (at 75% funding) and the State (at 25%).
    b. FEMA.
    c. The Department of Housing and Urban Development (HUD).
    d. Representatives of the Cora Brown Fund.

27. The amount of home repair assistance provided under the Disaster Housing Program is based on the damages incurred, as determined by a State inspection.

    ☐ True ☑ **False (Assistance is based on a FEMA inspection.)**

28. Transient accommodations includes rental reimbursement for:

    a. Mobile homes.
    b. Rental apartments.
    c. Travel trailers.
    d. Motels and hotels.

29. Disaster Unemployment Assistance is administered by the State and funded by FEMA.

    ☑ **True** ☐ False

30. Individual and Family Grants may be provided for (check all that apply):

    ☑ **Medical expenses.**
    ☑ **Transportation expenses.**
    ☐ Legal services.
    ☑ **Home repair.**
    ☑ **Replacement of essential personal property.**
    ☑ **Funeral expenses.**
    ☐ Tax assistance.
    ☑ **Protective measures.**

31. Eligibility for Economic Injury Disaster Loans is restricted to businesses located within the counties that are included in the Presidential disaster declaration.

    ☐ True ☑ **False (In the event of an SBA administrative disaster declaration or a declaration by the Secretary of Agriculture, individuals or businesses located in counties adjacent to those declared may also apply for certain types of disaster loans.)**

32. Agricultural Assistance includes:

    a. Emergency debris removal on farmland within a Presidentially declared disaster area.
    b. Repair of roadways in rural areas affected by the disaster.
    c. Assistance to counties within an area included in a disaster declaration by the Secretary of Agriculture.
    d. Provision of Federally-owned feed grain for livestock and herd preservation.

33. Eligible applicants for infrastructure support assistance within designated disaster areas include (check all that apply):

    ☑ **States.**
    ☑ **Native American tribes or authorized tribal organizations.**
    ☐ Eligible small businesses.
    ☑ **Alaska Native villages and organizations.**
    ☐ Voluntary agencies.
    ☐ Essential private-sector properties.
    ☑ **Qualifying private nonprofit organizations.**

34. Mitigation actions are accomplished by (check all that apply):

    ☑ **Acting on the hazard.**
    ☑ **Redirecting the hazard.**
    ☑ **Interacting with the hazard.**
    ☑ **Avoiding the hazard.**

35. Flood Mitigation Assistance (FMA) grants, made on an annual basis, can be awarded for planning assistance, implementation of actual mitigation projects, and **technical assistance**.

36. The **National Flood Insurance Program (NFIP)** provides flood insurance at a reasonable cost in exchange for the careful management of flood-prone areas by local communities.

37. Under **Project Impact**, FEMA offers expertise and technical assistance from both the national and regional levels to provide local governments with information and techniques on the latest mitigation practices.

38. Even without a Presidential declaration of a major disaster or emergency, these types of assistance (among others) are available from various Federal and regional agencies (check all that apply):

    ☑ **Search and rescue.**
    ☑ **Flood protection.**
    ☑ **Fire suppression assistance.**
    ☑ **Tax refunds.**
    ☑ **Voluntary organization assistance.**

39. When dealing with the hazardous weather events that are common to a community, it is important to know the definition of the event, **the characteristics common to the event**, and historical examples of the types and amounts of damage that each event may cause.

40. To be better prepared for your community's emergency planning process, consider which hazards are most likely to occur in your community, what damage they are likely to cause, which areas are likely to be hardest hit, and **how your Emergency Operations Plan (EOP) addresses the response**.

41. If a hazardous weather incident occurs, your community may require assistance from **mutual aid partners**, the State, and FEMA.

42. **Tornadoes** are the most violent storms on Earth.

43. **Flash flooding** is the number one weather-related killer in the United States.

44. Fire is a hazard that is sometimes associated with thunderstorms.

    ☑ **True** ☐ False

45. **Downbursts** are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground.

46. A tornado that is over water is a:

    a. Frontal system.
    b. Funnel cloud.
    c. Water spout.
    d. Microburst.

47. Nearly half of the number of victims killed by flash floods are:

    a. Boaters injured in debris flows.
    b. Rescue workers caught in mudslides.
    c. Children playing near culverts and drainage pipes.
    d. Motorists trapped in their vehicles.

48. Soils covered with vegetation enhance runoff and enable the rapid accumulation of water at low points.

    ☐ True ☑ **False**

49. A Flash Flood Watch covers precipitation, snow/ice melt, and **dam break conditions**.

50. The lakeshore flooding event that is known as a **seiche** occurs when winds push the lake water to one end of the lake and then, when the storm ends, the water sloshes to the other end of the lake, causing water level changes of up to several feet.

51. A storm surge usually arrives as a/an:

    a. Unusual rise in the barometric pressure.
    b. Abnormal rise in the tide.
    c. Rapidly moving wall of water.
    d. Downdraft resulting in a burst of high wind.

52. A Coastal Flood Statement informs the public that coastal flooding is possible approximately 12 to 36 hours after issuance time.

    ☐ True ☑ **False (A Coastal Flood Watch provides this information. A Coastal Flood Statement cancels a watch or a warning or clears part of the area that is no longer threatened.)**

53. Hurricane winds blow **counterclockwise** around the center, or eye, of the storm.

54. Hydrometeorological hazards associated with hurricanes include (check all that apply):

    ☑ **Coastal flooding caused by a storm surge**.
    ☑ **Windstorms resulting from extremely strong winds.**
    ☑ **Riverine flooding caused by heavy rains.**
    ☑ **Tornadoes.**

55. Winds that extend outward from a hurricane's eye wall in the *right front quadrant* are the most devastating.

    ☑ **True** ☐ False

56. **Snow squalls** are periods of moderate to heavy snowfall, intense, but of limited duration, accompanied by strong, gusty surface winds and possibly lightning.

57. The National Weather Service (NWS) issues this type of bulletin for winter weather situations that cause significant inconvenience but do not meet warning criteria and, if caution is not exercised, could lead to life-threatening situations.

    a. Short-term Forecast
    b. Winter Weather Advisory
    c. Special Weather Statement
    d. Winter Storm Outlook

58. A victim of hypothermia requires immediate medical help when body temperature drops to **95°F**.

59. About five percent of winter deaths attributed to exposure to cold occur in the home.

    ☐ True ☑ **False (About 20 percent occur in the home.)**

60. **Fog** is defined as water droplets suspended in the air at the Earth's surface.

61. The **Heat Index** is a measure of the effect of the combination of significantly high temperatures and high humidities.

62. These problems can result from excessively high temperatures (check all that apply):

    ☑ **Cramps and fainting**
    ☑ **Electrical brown-outs**
    ☑ **Changes in airplanes' performance**
    ☐ Increases in the body's salt levels

63. **Duststorms** can cause impaired visibility and breathing difficulties as well as scouring damage to buildings and automobiles.

64. A term used for the meteorological conditions that promote the spread of wildfire:

    a. Fire danger
    b. Fire weather
    c. Red-flag conditions
    d. Fuel/weather factor

65. The **epicenter** is the point on the Earth's surface directly above the focus of an earthquake—where geologists identify the earthquake's location.

66. Extremely strong earthquakes have magnitudes of **8** or more on the Richter Scale.

67. A **tsunami** is a series of ocean waves of extremely long length, generated by disturbances from earthquakes, underwater volcanic eruptions, or landslides occurring below or near the ocean floor.

68. In the United States, most terrorist incidents have involved individuals who use terrorism to achieve a general objective.

    ☐ True ☑ **False (They have involved small groups seeking to achieve a designated objective.)**

69. Anti-terrorism research has resulted in antidotes for all known chemical terrorism agents, but not as yet for all biological agents.

    ☐ True ☑ **False (Antidotes are available for some, but not all, chemical agents.)**

70. It is possible for a civilian to order the bacteria that causes bubonic plague from a privately owned United States company.

    ☑ **True** ☐ False

71. The most feasible, and thus the most likely, form of nuclear terrorism in the United States is:

    a. Importation of radioactive material.
    b. Theft of radioactive sources from legitimate industry.
    c. Clandestine manufacture of plutonium.
    d. Assault on a nuclear facility.

72. For biological warfare agents, concern for person-to-person contamination is limited to pneumonic plague and **smallpox**.

73. Half of the cases of inhalation anthrax in which treatment begins after the exhibition of symptoms result in death, regardless of the treatment.

    ☐ True ☑ **False (Almost all cases result in death.)**

74. Vaccination of the general population against the more common biological agents is expected to lessen the threat of domestic terrorism in the United States within five years.

    ☐ True ☑ **False (It is considered impractical to immunize a population not specifically at risk.)**

I: The FEMA Organization

I. THE FEMA ORGANIZATION

GENERAL INFORMATION

PURPOSE

The purpose of this section is to provide you with background information that will help you to understand FEMA's mission and operations. As an emergency manager, it will be helpful for you to be familiar with:

- ✦ FEMA's mission, values, and goals.
- ✦ The provisions of the Stafford Act.
- ✦ Key aspects of the disaster assistance process.
- ✦ Federal, State, local, private, and volunteer interests and organizations.
- ✦ FEMA disaster assistance programs and how they operate.

This section addresses these topics. You will have several opportunities to practice applying the information presented in the reading assignments by completing a series of knowledge assessments.

OBJECTIVES

After completing this assignment, you should be able to:

- ✦ Explain FEMA's mission, values, and goals.
- ✦ Discuss the basics of the Stafford Act.
- ✦ Explain how local governments respond to a disaster and/or a disaster declaration.
- ✦ Illustrate the disaster declaration process.
- ✦ Discuss the FEMA disaster assistance programs.

I. THE FEMA ORGANIZATION

CONTENTS OF THIS SECTION

This section consists of five parts:

- The part entitled **Federal Emergency Management Agency** explains the FEMA mission, values, and goals.
- **The Stafford Act** provides a basis for understanding the content of the Stafford Act and how it regulates the disaster declaration process.
- **Government Response to a Disaster Declaration** explains the actions governments take to respond to disasters.
- **The Disaster Field Office** describes how FEMA organizes to deliver services.
- **Disaster Assistance Programs** provides an overview of FEMA's disaster assistance programs.

I. THE FEMA ORGANIZATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

BACKGROUND INFORMATION

The Federal Emergency Management Agency (FEMA) was created in 1979 to coordinate Federal emergency authorities, including the administration of disaster response and recovery programs. This Agency is the successor to a number of other Federal agencies dating to 1950 that were responsible for disaster relief, emergency management, and disaster preparedness. FEMA assumed the role from the Federal Disaster Assistance Administration and also assumed responsibilities from the Federal Preparedness Agency, the Defense Civil Preparedness Agency, the Federal Insurance Administration, and the United States Fire Administration.

FEMA is headquartered in Washington, DC, with 10 Regional Offices that help plan, coordinate, and manage disaster assistance activities including preparedness, response, recovery, and mitigation. Other activities include offsite planning for emergencies at commercial nuclear powerplants and the Army's chemical stockpile sites, providing emergency food and shelter funding for the homeless, and planning to ensure the continuity of the Federal government during national security emergencies.

Reporting directly to the White House, FEMA manages the President's Disaster Relief Fund, the source of most Federal funding assistance after major disasters. FEMA also funds emergency programs and offers technical guidance and training. FEMA stands ready to deploy needed Federal resources in a catastrophic disaster. These coordinated activities ensure a broad-based program to protect life and property and provide recovery assistance after a disaster.

FEMA'S MISSION, VALUES, AND GOALS

FEMA's mission is to reduce the loss of life and property and protect institutions from all hazards by leading and supporting the Nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery.

To accomplish FEMA's mission, the following goals shape the Agency's priorities and policies:

- To create an emergency management partnership with other Federal agencies, State and local governments, volunteer organizations, and the private sector.
- To establish, in concert with FEMA's partners, a national emergency management system that is comprehensive, risk-based, and all-hazards in approach.
- To make mitigation the foundation of the national emergency management system.
- To provide a rapid and effective response to any disaster.
- To strengthen State and local emergency management.

FEMA is dedicated to working closely with all members of the emergency management community to improve the Nation's preparedness and increase its ability to respond to emergencies of all types. FEMA is a supportive partner to public and private organizations and groups that contribute to emergency management. Most life- and property-threatening emergencies are best dealt with at the State and local levels. FEMA supports these efforts by providing resources, guidance, and readiness to respond when demand exceeds local capabilities.

I. THE FEMA ORGANIZATION

FEMA'S ACTIVITIES

Through the coordination of planning and preparedness activities, and the provision of financial aid and technical support, FEMA provides the vital ingredients for an effective national emergency management system covering numerous diversified programs. These programs fall under the following general categorizations:

- Supporting State and local governments in a wide range of disaster planning, preparedness, mitigation, response, and recovery efforts.
- Coordinating Federal aid for Presidentially declared disasters and emergencies.
- Ensuring that individuals and communities affected by disasters are provided with high-quality customer service through staff training, surveys, and evaluations of disaster response and recovery operations.
- Developing practical applications of research to lessen the damaging effects of emergencies and disasters.
- Coordinating emergency preparedness for peacetime radiological accidents, including incidents at nuclear powerplants and hazardous materials incidents.
- Providing training, education, and exercises to enhance the professional development of Federal, State, and local emergency managers.
- Reducing the Nation's losses from fire.
- Overseeing the operation of the National Fire Academy and the Emergency Management Institute.
- Administering the insurance aspects, the flood loss reduction efforts, and the risk assessment activities of the National Flood Insurance Program.
- Acting as the lead agency for the National Earthquake Hazards Reduction Program.
- Chairing the Emergency Food and Shelter National Board.
- Developing community awareness programs for weather emergencies and home safety.

FEMA ORGANIZATIONAL STRUCTURE AND MAJOR FUNCTIONS

Funding is provided to seven major program offices to support emergency management. These program offices include the: Mitigation Directorate; Preparedness, Training, and Exercises Directorate; Response and Recovery Directorate; Federal Insurance Administration; United States Fire Administration; Operations Support Directorate; and the Information Technology Services Directorate. (A FEMA national organizational chart is shown on page I-8.)

Mitigation Directorate

The Mitigation Directorate initiates programs and studies to lessen the effects of natural and technological disasters upon life and property. This Directorate also assists in the recovery from declared disasters by providing technical and financial assistance to State and local governments, and to small business and individual property owners. The following are examples of the types of goods and services provided by the Mitigation Directorate:

- All-hazards public information materials.
- Architectural, engineering, and technical assistance for the mitigation of all natural hazard specific services.
- Cost and benefit analyses.
- Hurricane surge annotation and evacuation route planning.
- Community and interest group meetings.
- Mitigation, response and recovery, and loss estimation studies for all natural hazards.
- Flood hazard and erosion studies and surveys.
- Flood map revision, distribution, storage, and print processing.

Preparedness, Training, and Exercises Directorate

The Preparedness, Training, and Exercises (PT&E) Directorate develops training programs for Federal, State, and local government and private sector personnel in preparation for emergency management assignments. In addition, this Directorate develops comprehensive emergency management exercises for Federal, State, and local governments to test their skills.

The PT&E Directorate is responsible for the oversight of the Emergency Management Institute (EMI). EMI serves as the focal point for the delivery and development of emergency management training to enhance emergency capabilities of Federal, State, and local governments and the private sector.

The following are examples of the types of goods and services provided by the PT&E Directorate:

- Course development, revision, accreditation, and evaluation.
- Independent study programs.
- Course materials.
- Workshops.
- Evaluation of exercises.

Response and Recovery Directorate

The Response and Recovery Directorate develops and maintains an operational capability to respond to and to assist with recovery from the consequences of major disasters. This directorate integrates the efforts of Federal, State, and local governments; voluntary organizations; and the private sector. The following are examples of the types of goods and services provided by the Response and Recovery Directorate:

- ✦ Federal Response Plan management.
- ✦ Application processing services for individuals, municipalities, and private nonprofit organizations.
- ✦ Habitability inspections of disaster-damaged homes.
- ✦ Temporary housing programs.
- ✦ Human Services programs.
- ✦ Infrastructure Support programs.
- ✦ Customer service surveys of individual assistance applicants.

Federal Insurance Administration

The Federal Insurance Administration (FIA) directs Federal programs that provide consumer-oriented flood insurance and floodplain management activities to assist communities participating in the National Flood Insurance Program (NFIP).

The FIA also provides crime insurance where it is not available through other means. The following are examples of the types of goods and services provided by the FIA:

- ✦ Federal crime insurance servicing agent operation.
- ✦ Federal flood insurance servicing agent operation.
- ✦ Program and financial analysis.

United States Fire Administration

The United States Fire Administration (USFA) is responsible for all fire and emergency medical service programs. Fire prevention and mitigation activities are developed and delivered through the USFA. This program office utilizes programs designed to build State and local level capabilities aimed at reducing the Nation's loss of life and property from fire. Educational programs are provided through the National Fire Academy via on-campus training delivery systems.

Instructional areas include arson investigation, hazardous materials, fire prevention, code enforcement, and management sciences. The USFA is also responsible for operating and maintaining the National Emergency Training Center (NETC).

United States Fire Administration

The following are examples of the types of goods and services provided by the USFA:

- Advanced hazardous materials studies.
- Arson investigations and technical assistance.
- Developing and testing firefighting equipment.
- Fire data analysis and investigations.
- Fire protection systems studies.
- Local fire service planning.

Operations Support Directorate

The Operations Support Directorate provides the Agency's essential administrative support services. These services include: printing; graphic arts; management of FEMA's space and property; maintaining and disposing of official records; and providing housekeeping services, security, and acquisition services for FEMA Headquarters. In addition, the Operations Support Directorate develops policy on the use of information resources and information technologies in emergency management. The following are examples of the types of goods and services provided by the Operations Support Directorate:

- Administrative printing.
- Computer facilities management.
- Computer hardware.
- Management services.
- Computer software maintenance and support.
- Mechanical systems services.
- Publication storage and distribution.
- Background investigations.

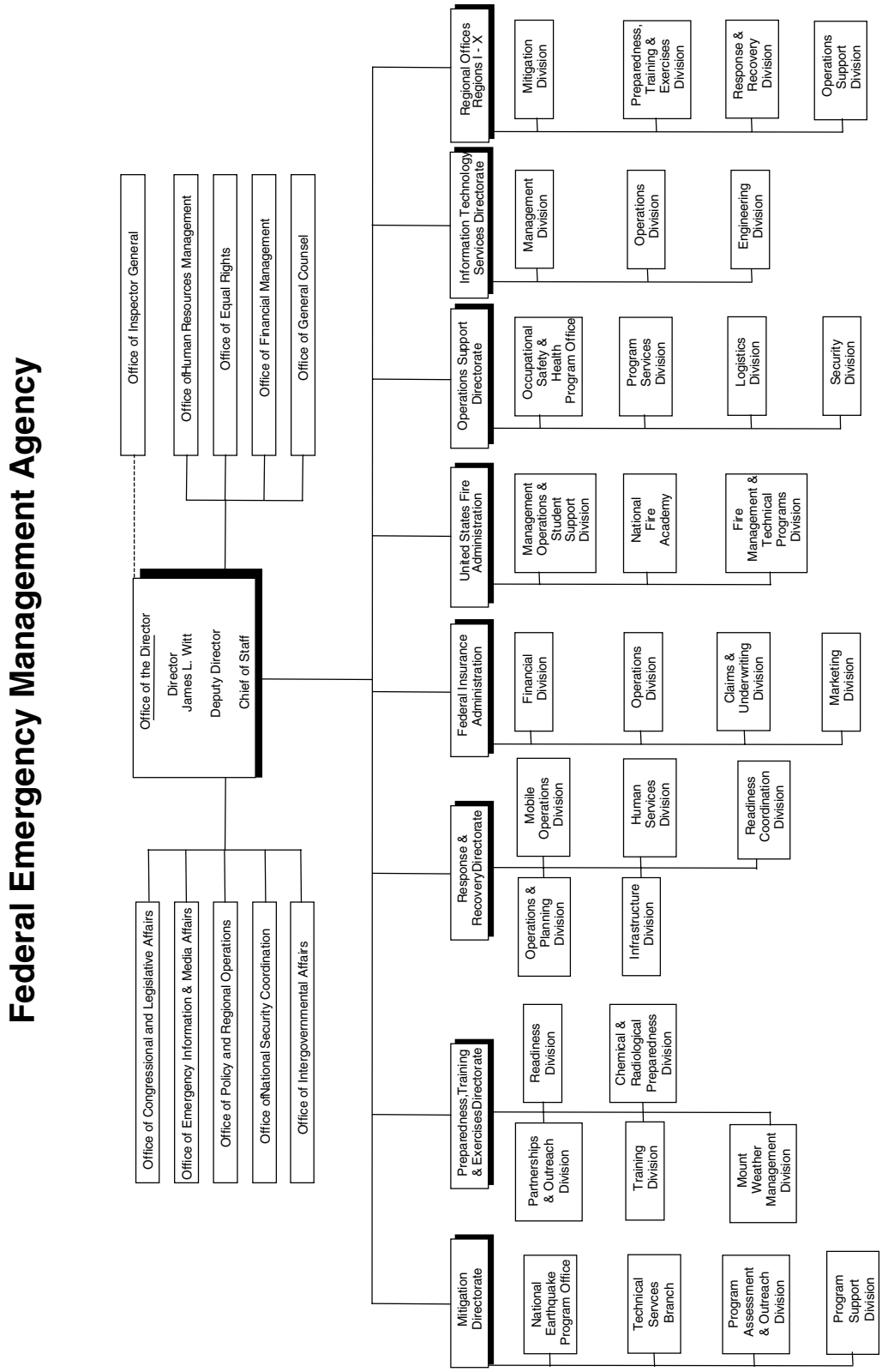
Information Technology Services Directorate

The Information Technology Services Directorate provides computer network services and support for the Agency. In addition, this Directorate provides communications support and develops computer applications to serve the Agency's various needs.

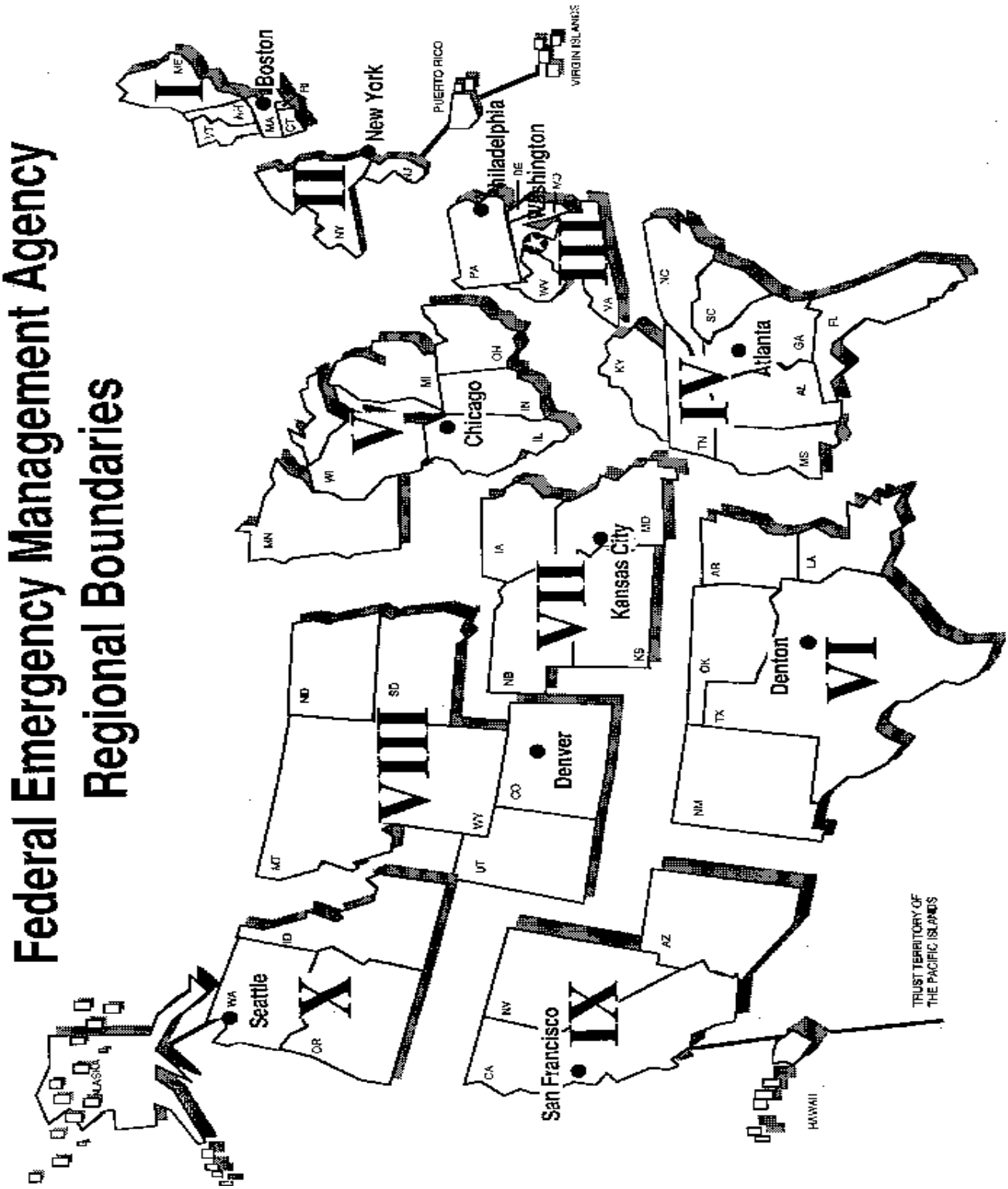
Office of Regional Operations

In addition to the program offices headquartered in Washington, DC, FEMA has 10 Regional Offices in direct support of the Nation's States and territories. (A map of FEMA's regional offices is shown on page I-9.) The Regional Offices are the primary sources through which FEMA's policies, programs, and program objectives are delivered and accomplished at the regional, State, and local levels. The Office of Regional Operations serves as the staff advisor and coordinator for the Director of FEMA on regional policy issues and regional operational matters.

FEMA National Organizational Chart



FEMA Regional Offices



FEMA KNOWLEDGE ASSESSMENT

Instructions: This short exercise will help you assess your current understanding of the history, mission, and structure of the Federal Emergency Management Agency. Please choose or provide the correct response(s) for each question, then check your answers against the answer key on pages I-13 through I-15.

1. The source of most Federal funding assistance after major disasters is:

   - ☐ A. Cora Brown Fund
   - ☐ B. Individual Family Grants
   - ☐ C. President's Disaster Relief Fund
   - ☐ D. Small Business Administration Loans

2. List <u>four</u> categories of disaster assistance activities performed by FEMA:

   _____

   _____

   _____

   _____

3. Several of FEMA's goals are listed below:

   - ✦ To make mitigation the foundation of the national emergency management system
   - ✦ To provide a rapid and effective response to any disaster
   - ✦ To strengthen State and local emergency management

   Add <u>one</u> more of FEMA's goals:

   _____

FEMA KNOWLEDGE ASSESSMENT

4. Most life- and property-threatening emergencies are best dealt with at which levels of government?

   _____

5. Developing community awareness programs for weather emergencies and home safety is a FEMA activity.

   ☐ True ☐ False

6. The development and delivery of emergency management training to enhance emergency capabilities of Federal, State, and local governments and the private sector is the responsibility of _____.

7. From the list below, check the correct types of goods and services provided by the Mitigation Directorate:

   ☐ A. Hazardous materials studies
   ☐ B. All-hazards public information materials
   ☐ C. Flood hazard and erosion studies and surveys
   ☐ D. Mobile home installation and maintenance

8. From the list below, check the correct types of goods and services provided by the Response and Recovery Directorate:

   ☐ A. Federal Response Plan management
   ☐ B. All-hazards public information materials
   ☐ C. Human services programs
   ☐ D. Temporary housing programs

FEMA KNOWLEDGE ASSESSMENT

9. From the list below, check the correct types of goods and services provided by the United States Fire Administration:

   - ☐ A. Fire protective clothing
   - ☐ B. Fire data analysis and investigations
   - ☐ C. Advanced hazardous materials studies
   - ☐ D. Arson investigations and technical assistance

10. From the list below, check the correct types of goods and services provided by the Operations Support Directorate:

   - ☐ A. Management services
   - ☐ B. Cost and benefit analysis
   - ☐ C. Teleconference services
   - ☐ D. Mechanical systems services

FEMA KNOWLEDGE ASSESSMENT ANSWER KEY

1. The source of most Federal funding assistance after major disasters is:

   ✓ **C. President's Disaster Relief Fund**

   Reporting directly to the White House, FEMA manages the President's Disaster Relief Fund, the source of most Federal funding assistance after major disasters.

2. List four categories of disaster assistance activities performed by FEMA:

   ✓ **Preparedness**
   ✓ **Response**
   ✓ **Recovery**
   ✓ **Mitigation**

   FEMA has 10 Regional Offices that help plan, coordinate, and manage disaster assistance activities including preparedness, response, recovery, and mitigation. Other activities include offsite planning for emergencies at commercial nuclear powerplants and the Army's chemical stockpile sites, providing emergency food and shelter funding for the homeless, and planning to ensure the continuity of the Federal Government during national security emergencies.

3. Several of FEMA's goals are listed below:

   ✦ To make mitigation the foundation of the national emergency management system
   ✦ To provide a rapid and effective response to any disaster
   ✦ To strengthen State and local emergency management

   Add one more of FEMA's goals:

   ✓ **To establish, in concert with FEMA's partners, a National emergency management system that is comprehensive, risk-based, and all-hazards in approach**, or
   ✓ **To create an emergency management partnership with other Federal agencies, State and local governments, voluntary organizations, and the private sector**

   Either answer would be correct. To accomplish FEMA's mission, all of the above goals shape the priorities and policies to be implemented.

FEMA KNOWLEDGE ASSESSMENT ANSWER KEY

4. Most life- and property-threatening emergencies are best dealt with at which levels of government?

   ✓ **State and local**

   Most life- and property-threatening emergencies are best dealt with at the State and local levels of government. However, FEMA supports these efforts by providing resources, guidance, and readiness to respond when demand exceeds local capabilities.

5. Developing community awareness programs for weather emergencies and home safety is a FEMA activity.

   ✓ **True.** Through numerous diversified programs, including community awareness programs, FEMA provides the vital ingredients for an effective national emergency management system.

6. The development and delivery of emergency management training to enhance emergency capabilities of Federal, State, and local governments and the private sector is the responsibility of

   ✓ **The Emergency Management Institute (EMI)**.

   The Preparedness Directorate is responsible for the oversight of EMI. EMI serves as the focal point for the development and delivery of emergency management training to enhance emergency capabilities of Federal, State, and local governments and the private sector.

7. Types of goods and services provided by the Mitigation Directorate include:

   ✓ **B. All-hazards public information materials**

   ✓ **C. Flood hazard and erosion studies and surveys**

   Hazardous materials studies are provided by the United States Fire Administration, and mobile home installation and maintenance are provided by the Response and Recovery Directorate.

8. Types of goods and services provided by the Response and Recovery Directorate include:

   ✓ **A. Federal Response Plan management**

   ✓ **C. Human services programs**

   ✓ **D. Temporary housing programs**

   All-hazards public information materials are provided by the Mitigation Directorate.

FEMA KNOWLEDGE ASSESSMENT ANSWER KEY

9. Types of goods and services provided by the United States Fire Administration include:

   ✓ **B. Fire data analysis and investigations**
   ✓ **C. Advanced hazardous materials studies**
   ✓ **D. Arson investigations and technical assistance**

   The United States Fire Administration does not provide fire protective clothing.

10. Types of goods and services provided by the Operations Support Directorate include:

   ✓ **A. Management services**
   ✓ **D. Mechanical systems services**

   Cost and benefit analysis is provided by the Mitigation Directorate, and teleconference services are provided by the Response and Recovery Directorate.

THE STAFFORD ACT

OVERVIEW

The Stafford Act is the result of years of congressional effort to provide relief during disasters and emergencies. This reading assignment presents background information about the Act. The Act establishes the Presidential declaration process for major disasters and emergencies, provides for the implementation of disaster assistance, and sets forth the various disaster assistance programs.

HISTORY AND PHILOSOPHY OF THE FEDERAL ASSISTANCE PROGRAM

Before 1950, there was no comprehensive disaster program. Disaster recovery was funded by Congress on an incident-by-incident basis. In 1950, Congress enacted the initial disaster relief program, Public Law 81-875. Under this law:

- Funding was authorized for a disaster relief program rather than a single-incident response.
- The responsibility for determining when Federal disaster relief is required was transferred from Congress to the President.
- The basic philosophy of Federal disaster relief was established—that Federal assistance is supplemental to State and local resources.
- The basis for later legislation on cost-sharing between Federal and State or local governments was established.
- Provisions were made for emergency repairs to or temporary replacement of essential public facilities.
- Aid was provided only to State and local governments.
- Individuals could rely on the American Red Cross, the Salvation Army, the Mennonite Disaster Service, and other charitable organizations.

Nearly 20 years later, the Disaster Relief Act of 1969 was enacted. This law introduced the concept of the Federal Coordinating Officer (FCO), and placed the management of Federal disaster relief under one individual who was appointed by the President.

In April 1974, there was a series of devastating tornadoes that hit six Midwestern States. This event confirmed the need to add assistance to individuals and families to the Disaster Relief Program. As a result, the Disaster Relief Act of 1974 (Public Law 93-288) was established. Under this law:

- The Individual and Family Grant Program was established.
- Federal and State disaster relief operations are conducted on a partnership basis, and a State Coordinating Officer (SCO) works jointly with an FCO.
- Federal assistance supports local and State activities and resources.
- Assistance is contingent upon a Presidential declaration.

Before 1981, the Public Assistance Program, which provided disaster assistance to State and local governments, was in the form of a 100 percent Federal grant. The response to the eruption of Mount St. Helen's in May 1980 was the first administrative implementation of a 75 percent Federal and 25 percent State and local cost-sharing of disaster expenses. This response was the first step toward a cost-sharing full-partnership concept of managing disaster response and recovery.

HISTORY AND PHILOSOPHY OF THE FEDERAL ASSISTANCE PROGRAM

During the 1980's, the Senate expressed concern about the use of the disaster authority for responding to nonnatural disasters or emergencies such as managing the Cuban refugee influx. This event, as well as a number of perceived deficiencies, stimulated Congress to review disaster programs. Over the next several years, legislation was initiated to change Public Law 93-288.

In November 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act was passed. This act provided a framework for continued disaster relief. It also legislated a minimum 75 percent Federal/25 percent State and local cost-sharing for the public assistance program. The Stafford Act refocused assistance for nonnatural disasters, regardless of their causes, to a more limited scope. It also confirmed the importance of individual assistance and added an emphasis on mitigation of future losses.

Disaster Assistance Programs included in the Stafford Act are:

- Human Services Programs (formerly called Individual Assistance) in the form of individual and family grants and temporary housing.
- Public Assistance, including grants for emergency work, repair and restoration, and debris removal.
- Mitigation grants to reduce long-term risk to life and property from natural or technological disasters.

Congress amended the Stafford Act in October 1993 to expand the scope of mitigation to include acquisition of properties in floodplains. The October 1994 amendment incorporated the Title VI, Civil Defense Statute, into the Stafford Act. This amendment allows FEMA to implement an all-hazards approach to preparedness.

PROVIDING FEDERAL DISASTER ASSISTANCE

The Stafford Act provides the authority for FEMA's role in managing Federal disaster assistance. This role includes:

- Helping assess the damage after a disaster.
- Evaluating a Governor's request for a Presidential declaration.
- Advising the President concerning recommendations for declarations.
- Working with the State and local governments in a joint partnership to implement the various assistance programs.
- Coordinating the activities of other Federal agencies and volunteer organizations.
- Managing the President's Disaster Relief Fund.

PROVIDING FEDERAL DISASTER ASSISTANCE

The Stafford Act established the Presidential Declaration Process. There are four steps in this process:

Step 1. A joint FEMA/State Preliminary Damage Assessment.

Step 2. The Governor's request for assistance.

Step 3. FEMA's recommendation to the President regarding the request.

Step 4. The Presidential Declaration.

⇨ ***FEMA's role in managing Federal disaster assistance and the Presidential Declaration Process is discussed in greater detail in the part entitled, Government Response to a Disaster Declaration, beginning on page I-26.***

TYPES OF INCIDENTS

The Stafford Act defines the types of incidents considered to be covered by a disaster declaration. It identifies two bases for a declaration by the President:

- **Major Disaster**. Major disasters may be caused by such natural events as floods, hurricanes, and earthquakes. Regardless of cause, they also include fires, floods, or explosions that the President feels are of sufficient magnitude to warrant Federal assistance. Although the types of incidents that may qualify as a major disaster are limited, the Federal assistance available is broader than for emergencies.
- **Emergency**. Emergencies involve any event for which the President determines that there is a need to supplement State and local efforts in order to save lives, protect property and public health, and ensure safety. Many different types of incidents may qualify as an emergency; however, the Federal assistance available for emergencies is more limited than that available for a major disaster.

OTHER ASSISTANCE

Under the Stafford Act, assistance for major disasters and emergencies is available only upon a declaration by the President. However, even when the President does not issue a major disaster or an emergency declaration, there may be certain types of assistance available through various Federal agencies including the Corps of Engineers, the Department of Agriculture, and the Small Business Administration (SBA). Without a declaration, disaster assistance may include any of the following:

- Search and rescue.
- Flood protection.
- Fire suppression assistance.
- Health and welfare.
- Emergency conservation programs.
- Emergency loans for agriculture.
- Disaster loans for homeowners or businesses.
- Repairs to Federal Aid System roads.
- Tax refunds.
- Voluntary agency assistance.

⇨ ***Additional information about these programs is presented in the part entitled, Disaster Assistance Programs, beginning on page I-47.***

Implementation details for the Stafford Act are provided in Title 44 of the Code of Federal Regulations (44 CFR). The regulations establish the Stafford Act's disaster relief programs and spell out the roles of individuals and agencies involved in providing assistance.

THE STAFFORD ACT KNOWLEDGE ASSESSMENT

Instructions: This short exercise will help you assess your current understanding of the history and provisions of the Stafford Act. Please choose or provide the correct response(s) for each question, then check your answers against the answer key on pages I-23 through I-25.

1. Who is responsible for requesting that the President declare an emergency or disaster?

   ☐ A. The Federal Coordinating Officer (FCO)

   ☐ B. The congressional representative(s) from the affected area(s)

   ☐ C. The State Senator from the affected area(s)

   ☐ D. The Governor of the affected State

2. What is the minimum Federal cost-share of disaster assistance in a declared disaster?

   ☐ A. 100 percent

   ☐ B. 75 percent

   ☐ C. 50 percent

   ☐ D. 25 percent

3. Sequence the following events in the disaster declaration process in the order in which they occur.

   — A. FEMA makes a recommendation to the President.

   — B. FEMA and the State and local governments conduct a preliminary damage assessment.

   — C. The event occurs.

   — D. The President makes a declaration, if warranted.

   — E. The Governor requests assistance.

4. FEMA can provide States with Federal assistance for major disasters and emergencies whether or not the President has declared the disaster or emergency.

   ☐ True ☐ False

THE STAFFORD ACT KNOWLEDGE ASSESSMENT

5. Which of the following statements contains the <u>only</u> events that may be declared as disasters or emergencies by the President?

   - ☐ A. Flood, fire, explosion, hurricane, earthquake, tornado, snowstorm, or drought
   - ☐ B. Any natural catastrophe, as well as fire or explosion
   - ☐ C. Any occasion or instance for which Federal assistance is needed, as determined by the President
   - ☐ D. Any natural or manmade catastrophe in which lives are in danger

6. An applicant is eligible for Federal assistance to repair, restore, or replace property that is damaged as a result of a declared disaster, regardless of whether the individual's own insurance will cover the damage.

   ☐ True ☐ False

7. A Governor may make a request for Federal disaster assistance if the disaster is of such severity and magnitude that effective response is beyond the capabilities of the State and local governments.

   ☐ True ☐ False

8. The President may deny a request for a disaster declaration for which of the following reasons? *(Check all that apply.)*

   - ☐ A. The Federal Government judges that adequate assistance is available thorough other sources.
   - ☐ B. Congress vetoes the declaration.
   - ☐ C. State and local governments are able to provide the necessary assistance themselves.
   - ☐ D. The Preliminary Damage Assessment is submitted on the incorrect forms.

THE STAFFORD ACT KNOWLEDGE ASSESSMENT

9. The Stafford Act changed previous disaster assistance legislation to make assistance available on an incident-by-incident basis.

   ☐ True ☐ False

10. Without a Presidential disaster declaration, disaster assistance may include: *(Check all that apply.)*

   ☐ A. Unemployment assistance
   ☐ B. Search and rescue
   ☐ C. Flood protection
   ☐ D. Fire suppression assistance
   ☐ E. Hazard mitigation

THE STAFFORD ACT KNOWLEDGE ASSESSMENT ANSWER KEY

1. Who is responsible for requesting that the President declare an emergency or disaster?

   ✓ **D. The Governor of the affected State** is responsible for requesting that the President declare an emergency or disaster.

2. What is the minimum Federal cost-share of disaster assistance in a declared disaster?

   ✓ **B. 75 percent**

3. The sequence of events in a Presidential disaster declaration process is:

   C. The event occurs.

   B. FEMA and the State and local governments conduct a preliminary damage assessment.

   E. The Governor requests assistance.

   A. FEMA makes a recommendation to the President.

   D. The President makes a declaration, if warranted.

4. FEMA can provide States with Federal assistance for major disasters and emergencies whether or not the President has declared the disaster or emergency.

   ✓ **False.** Under the Stafford Act, assistance for major disasters and emergencies is available from FEMA only upon a declaration by the President. However, when the President does not issue a major disaster or an emergency declaration, there may be certain types of assistance available through various Federal agencies including the U.S. Army Corps of Engineers, the Department of Agriculture, and the Small Business Administration.

THE STAFFORD ACT KNOWLEDGE ASSESSMENT ANSWER KEY

5. The statement below contains the only events that may be declared as disasters or emergencies by the President.

   ✓ **B. Any natural catastrophe, as well as fire or explosion.**

6. An applicant is eligible for Federal assistance to repair, restore, or replace property that is damaged as a result of a declared disaster, regardless of whether the individual's own insurance will cover the damage.

   ✓ **False.** Eligibility for Federal assistance to repair, restore, or replace property that is damaged as a result of a declared disaster is conditional on whether the individual's insurance company will cover the damages.

7. A Governor may make a request for Federal disaster assistance if the disaster is of such severity and magnitude that effective response is beyond the capabilities of the State and local governments.

   ✓ **True.** All requests for a Presidential disaster declaration shall be made by the Governor of the affected State. Such a request shall be based on a finding that the disaster is of such severity and magnitude that effective response is beyond State and local government capabilities and that Federal assistance is necessary.

8. The President may deny a request for a disaster declaration for the following reason:

   ✓ **A. The Federal Government judges that adequate assistance is available through other sources.**

   ✓ **C. State and local governments are able to provide the necessary assistance themselves.**

9. The Stafford Act changed previous disaster assistance legislation to make assistance available on an incident-by-incident basis.

   ✓ **False.** The intent of the Stafford Act is to provide an orderly and continuing means of assistance from the Federal Government to State and local governments carrying out their responsibilities to alleviate the suffering and damage that result from disasters.

THE STAFFORD ACT KNOWLEDGE ASSESSMENT ANSWER KEY

10. Without a Presidential disaster declaration, disaster assistance may include:

- ✓ **B. Search and rescue**
- ✓ **C. Flood protection**
- ✓ **D. Fire suppression assistance**

Any of the following types of assistance may also be included:

- ✓ Health and welfare
- ✓ Emergency conservation programs
- ✓ Emergency loans for agriculture
- ✓ SBA disaster loans
- ✓ Repairs to Federal Aid System roads
- ✓ Tax refunds
- ✓ Voluntary agency assistance

GOVERNMENT RESPONSE TO A DISASTER DECLARATION

OVERVIEW

This section describes how local, State, and Federal governments respond to a disaster and/or a disaster declaration. The topics are:

- ✦ Emergency management at the local, State, and Federal levels.
- ✦ The disaster response and recovery cycle.
- ✦ Requesting Federal assistance.
- ✦ The Federal Response Plan.

LOCAL RESPONSE AND RECOVERY ACTIVITIES

Local governments are the first line of defense against emergencies and are primarily responsible for managing the response to emergencies and disasters. At the local level of government, the primary responsibility for the protection of citizens belongs to such local elected officials as mayors, city councils, and boards of commissioners.

When a local government receives a warning that an emergency could be imminent, its first priority is to warn citizens and take whatever actions are needed to minimize damage and protect life and property. If necessary, an evacuation may be ordered.

When a disaster occurs, fire, police, medical, and rescue personnel rush to emergency sites to provide aid immediately following the emergency. The local government works to ensure public order and security. Vital services (e.g., water, power, communications, transportation, shelter, and medical care) are provided, and debris removal begins. Public and private utility company crews, along with other emergency teams, begin restoring essential services. In addition, the local government coordinates efforts with local voluntary agencies that assist individuals and families in need.

When a local government responds to an emergency, the level of the response and the types of resources required are determined by several factors, including the:

- ✦ Speed of onset of the emergency.
- ✦ Potential need for evacuation.
- ✦ Magnitude of the situation.
- ✦ Projected duration of the event.
- ✦ Extent of the threat to the citizens.

In an emergency, the local government is responsible for responding to the event in a way that will contain the emergency, protect people and property, and minimize damage. The local government is also responsible for overall management and coordination of an effective response, and conducting initial assessments of damage.

STATE RESPONSE AND RECOVERY EFFORTS

All States have laws that describe the responsibilities of the State government in emergencies and disasters. These laws provide Governors and State agencies with the authority to plan for and carry out the necessary actions to respond to and recover from emergencies. State emergency management legislation describes the duties and powers of the Governor, whose authority includes the power to declare a state of emergency and to decide when to terminate this declaration.

State Emergency Management Offices

Many of the responsibilities to perform and maintain the provisions of emergency management legislation are generally delegated to the State emergency management offices. These offices are organized in a number of ways and have different names. Emergency managers are responsible for preparing for emergencies and coordinating the activation and use of resources controlled by the State government when they are needed to help local governments respond to and recover from emergencies and disasters.

✦ Role of the State Emergency Management Office

In its coordinating role, the State emergency management office is involved in virtually all serious emergencies or disasters. This organization is responsible for receiving the situation reports from local agencies. Based on these and other data, emergency management officials work in consultation with other agency representatives and members of the Governor's staff to determine what types of resources and personnel should be deployed to the affected areas. Using procedures specified in the State Emergency Operations Plan, the State emergency management organization will coordinate deployment of State personnel and resources to the affected areas.

✦ State Resources

When a State emergency is declared, the Governor (or emergency management agency official acting for the Governor) can mobilize the resources of State agencies to provide any necessary assistance. Communities can then use State resources to supplement their own supplies, equipment, and personnel. For example, in a situation in which large populated areas are threatened by the continued rise of flood waters, the State could assist in evacuation of the threatened area by prescribing evacuation routes and helping to control points of entry and departure from the disaster area.

In many States, Governors can suspend State laws or local ordinances if it is determined that the law in question will restrict or prohibit efforts to relieve human suffering caused by the disaster. In some States, after a State emergency declaration, the Governor may establish economic controls over such resources and services as food, wages, clothing, and shelter in the affected area.

Under a State emergency declaration, Governors are empowered to mobilize the National Guard and direct its efforts. Generally, Governors are granted the power to use all available State resources needed to respond effectively and efficiently to the event. The Governor is able to draw upon the resources, expertise, and knowledge of State agencies as needed to assist in the effort. In many disasters, the States can provide technical assistance and resources that would not be available to most local officials within their own communities.

THE DISASTER RESPONSE AND RECOVERY CYCLE

When a disaster or emergency occurs, local, State, and Federal governments, as well as voluntary agencies, respond immediately. This collective response follows a step-by-step process that has been developed and revised through legislation and through lessons learned in previous disasters. (See pages I-29, I-33, and I-34 for a detailed description of the disaster response and recovery process.)

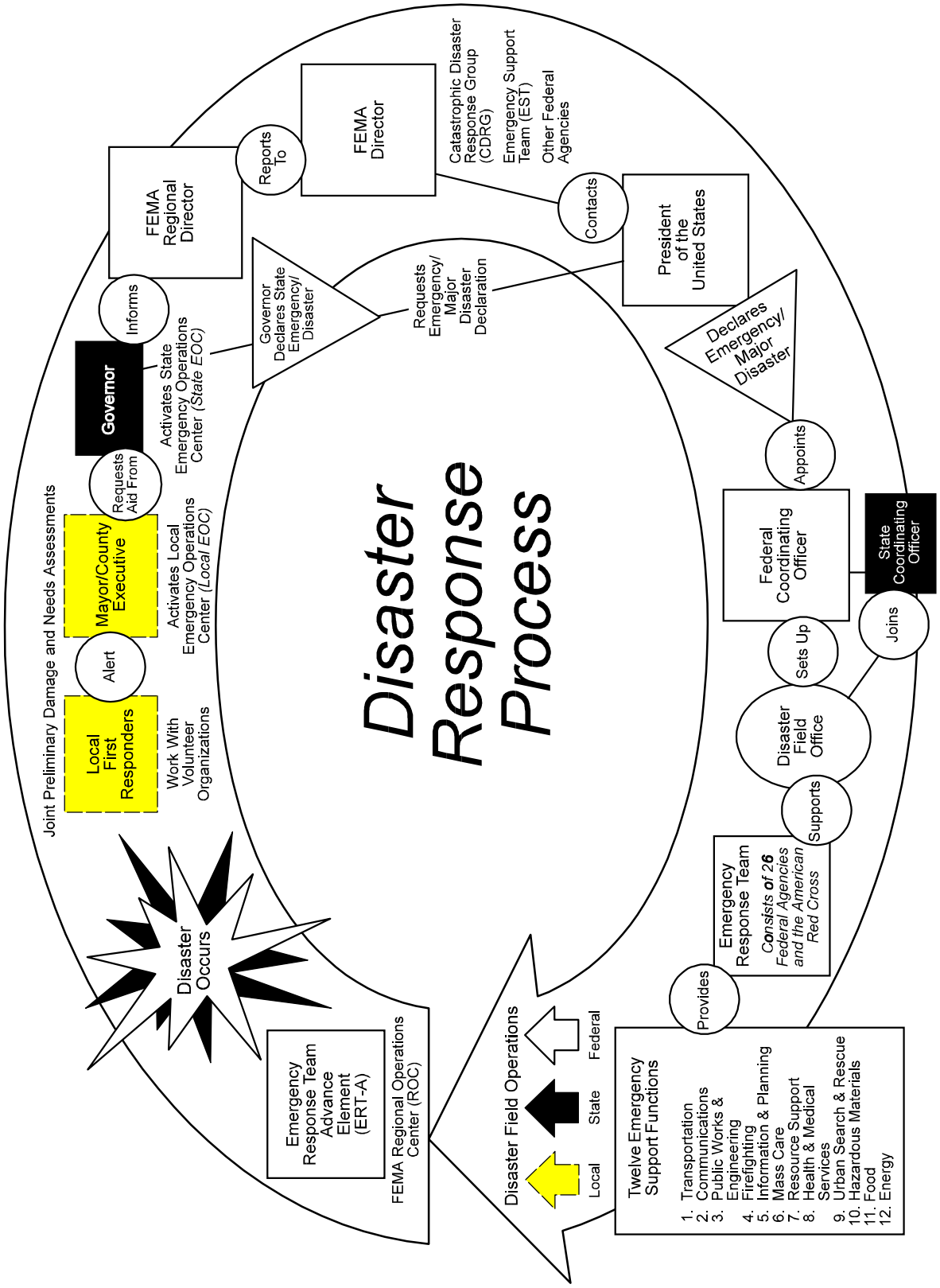
The following are the basic steps of the disaster response process:

Step 1: A disaster or emergency occurs.

Step 2: Local and State governments activate their Emergency Response Plans and Emergency Operations Centers.

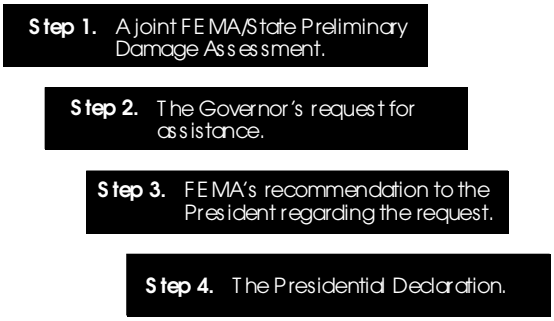
The State may request a disaster declaration after these steps are taken.

The Disaster Response and Recovery Process



THE DECLARATION PROCESS

Let's take a closer look at the declaration process. There are four steps in this process:



Step 1. A joint FEMA/State Preliminary Damage Assessment. FEMA and State representatives complete a Preliminary Damage Assessment (PDA). This step involves an inspection of the area to document the impact of the event and to make an initial estimate of the dollar amount of the damage. This assessment establishes a foundation for any request for assistance the Governor may decide to make and provides details on the types of assistance needed. It also provides background for FEMA's analysis of the recommendations on the request and supplies information that will be helpful to those who will manage the recovery operation.

Step 2. The Governor's request for assistance. This request, by law, must declare that State and local resources are inadequate. It must also include a damage estimate, describe the State and local resources committed to response and recovery, describe the assistance being requested, and agree to cost share.

Step 3. FEMA's recommendation to the President regarding the request. The Governor's request is addressed to the President through the FEMA Regional Director. The Regional Office transmits the request to FEMA Headquarters along with an analysis and recommendations. The request is reviewed by FEMA Headquarters staff to ensure that it meets all the requirements of the Stafford Act. FEMA's Director then recommends a course of action to the President, and the request is hand carried to the White House.

Step 4. The Presidential Declaration. After a White House review, the President decides whether to declare that a major disaster exists, thereby making assistance available under the Stafford Act. The President also appoints a Federal Coordinating Officer (FCO) to oversee the disaster operations.

Under normal circumstances, this process may take several days; however, in cases where an immediate Federal response is needed to save lives or protect public health and safety, an expedited disaster request may start the process within hours.

After the President declares a major disaster, the FEMA-State Agreement is prepared by the FEMA Regional Director and the Governor. This agreement establishes the period of the incident, identifies the types of assistance to be provided, lists the areas eligible for assistance, sets forth the agreed-upon cost-share provisions, and describes other terms and conditions.

FEMA'S ROLE IN MANAGING DISASTERS

After the President declares a Federal emergency or disaster, FEMA assumes several roles in the disaster recovery process, which include:

- Helping State governments in requesting disaster assistance.
- Evaluating requests for assistance.
- Making recommendations to the President.
- Implementing disaster assistance programs.
- Coordinating the activities of other Federal agencies and voluntary organizations under the Federal Response Plan.
- Managing the President's Disaster Relief Fund.

THE FEDERAL RESPONSE PLAN

FEMA uses the Federal Response Plan (FRP) to coordinate the Government response to disaster or emergency situations. The FRP is applicable to:

- Natural disasters involving earthquakes, hurricanes, typhoons, tornadoes, volcanic eruptions, floods, and fires.
- Technological emergencies involving radiological or hazardous materials.
- Other incidents requiring Federal assistance under the Stafford Act.

The FRP describes the basic mechanisms and structures by which the Federal Government mobilizes resources and conducts activities to augment State and local response efforts. To facilitate the provision of Federal assistance, the FRP uses a functional approach to group the types of Federal assistance that a State is most likely to need under the 12 Emergency Support Functions (ESFs).

THE FEDERAL RESPONSE PLAN

✦ Emergency Support Functions

Each ESF is headed by a primary agency that has been selected based on its authorities, resources, and capabilities in the particular functional area. Other agencies have been designed as support agencies for one or more ESF(s) based on their resources and capabilities to support the functional area. The ESFs are as follows:

- ✧ ESF-1: Transportation
- ✧ ESF-2: Communications
- ✧ ESF-3: Public Works and Engineering
- ✧ ESF-4: Firefighting
- ✧ ESF-5: Information and Planning
- ✧ ESF-6: Mass Care
- ✧ ESF-7: Resource Support
- ✧ ESF-8: Health and Medical Services
- ✧ ESF-9: Urban Search and Rescue
- ✧ ESF-10: Hazardous Materials
- ✧ ESF-11: Food
- ✧ ESF-12: Energy

✦ ESFs Are Disaster Team Members

The ESFs work together to provide needed support and services. Not all ESFs are needed on every disaster. When ESFs are activated, their representatives may work at FEMA Headquarters as part of the Emergency Support Team (EST) or in the Disaster Field Office. In the Disaster Field Office, ESF representatives become part of the Emergency Response Team (ERT). The Federal Coordinating Officer, or FCO, is the leader of the ERT.

SUMMARY

The table on the following pages summarizes the major events in the disaster declaration process and initial response activities.

Anatomy of a Disaster Declaration

The following table provides basic information about the disaster declaration process and initial response activities. It should be noted that in catastrophic situations or disasters of National interest, the process can be expedited.

Incident	The incident is the event causing widespread destruction or losses that may trigger a disaster declaration. This event may be a flood, fire, hurricane, or other event as specified in Public Law 93-288 as amended (The Stafford Act). While the event may be considered a disaster in a given area, as far as FEMA or other Federal agencies are concerned, no Federal recovery programs may be implemented until the President signs a disaster declaration. Not all incidents result in Presidential declarations. According to the Stafford Act, response to the incident must be beyond the combined capability of local and State governments to qualify for a declaration.
Initial Federal Response	The **Regional Operations Center** (ROC) is activated. Staff are deployed to the ROC either at the Regional Office or Federal Regional Center to provide technical assistance and coordinate with the State. (**Note:** The ROC may be staffed before an incident occurs—e.g., a hurricane.) The **Emergency Support Team** (EST) may be activated at FEMA Headquarters depending on the projected scope and potential impacts. Either a full EST with all Emergency Support Functions (ESFs) or only a partial EST including only a limited number of functions may be activated. With a limited EST, the Information and Planning Function (ESF-5) will most likely be activated to generate Situation Reports (SitReps) and other documents. (**Note:** The EST may be staffed before an incident—e.g., a hurricane.) The **National Emergency Response Team** (ERT-N) will be deployed from FEMA Headquarters by the Director of FEMA in catastrophic situations, providing staff to support State and FEMA regional resources.
Preliminary Damage Assessments	The State asks FEMA, through the Regional Office, to participate in a Preliminary Damage Assessment (PDA). The PDA identifies the potential need for an Individual Assistance, Public Assistance, or Mitigation disaster declaration. Teams consisting of representatives from FEMA, the State, and other Federal or State agencies (as appropriate) review the impact on individuals and public facilities. PDA findings are used as the basis for the Governor's request and also are used by FEMA in developing two key documents: the Regional Summary and the Regional Analysis and Recommendations. These documents are prepared after a request for a disaster declaration is received from the Governor. Neither are public documents; they are only Regional or Headquarters recommendations. *In catastrophic or severe situations, the Governor's request may be submitted to FEMA prior to the PDA.*
Governor's Request	The Governor will request a major disaster declaration based on a determination by the State that the response is beyond the financial or operational capabilities of both the local and the State governments. The request is submitted through FEMA to the White House. *Once a request is received, it is considered **"in process"** until a determination is made by the White House. This process can take a matter of hours in a catastrophic situation or as long as several weeks or even months, depending on the nature of the request.*

Anatomy of a Disaster Declaration

Regional Summary/ Regional Analysis and Recommendation	These documents outline the scope of the losses and make recommendations as to the needs of the disaster-affected area. The FEMA Director reviews these documents and forwards a recommendation to the President.
Presidential Disaster Declaration	If the situation is of significant severity and magnitude to warrant a major disaster or an emergency declaration, the President signs the declaration. If, after careful review by FEMA and the White House, the situation does not meet the standards established by the Stafford Act, a request may be denied. A letter explaining the denial is sent to the Governor by the Director of FEMA. States have the right to appeal. When a disaster is declared, the scope of the assistance programs identified by the President and the affected counties is designated by the Director of FEMA. The President appoints a Federal Coordinating Officer (FCO) to direct the Federal response and recovery activities. The FCO has the authority to include additional counties if further investigation proves such action is warranted.
Disaster Field Office Established	The DFO is established within 48 hours of the declaration to provide a base of operations for Federal and State agencies involved in the response and recovery activities. (The DFO is covered in detail in the next part of this section.)
FEMA/State Agreement	The FEMA/State Agreement details the terms under which Federal aid is granted, including any cost-sharing provisions. This document is signed by the Governor and the FEMA Regional Director. The FCO may amend this agreement. Examples of amendments include the addition of other counties to the declaration or establishment of an end date for the incident period (if it was not determined at the onset of the disaster).
Federal/State Meeting	This meeting involves representatives from all Federal, State, and voluntary agencies offering programs for people and communities affected by the disaster. The programs are explained to the State during this meeting.

GOVERNMENT RESPONSE TO A DISASTER DECLARATION KNOWLEDGE ASSESSMENT

Instructions: This short exercise will help you assess your current understanding of the Government response to a disaster declaration. Please choose or provide the correct response(s) for each question, then check your answers against the answer key on pages I-38 through I-40.

1. Federal disaster assistance:

   ☐ A. Replaces State assistance.

   ☐ B. Supports efforts at the State and local levels.

   ☐ C. Is guaranteed when a disaster occurs.

   ☐ D. Is available only under a Presidential disaster declaration.

2. Under a State emergency declaration, the Governor is empowered to mobilize the National Guard and direct its efforts.

   ☐ True ☐ False

3. As soon as an event occurs, the local and State governments work with FEMA to assess damages and determine if Federal assistance is required.

   ☐ True ☐ False

4. The local government helps to protect citizens in an emergency by: *(Check all that apply.)*

   ☐ A. Activating its local emergency operations plan.

   ☐ B. Warning citizens.

   ☐ C. Reporting to State officials.

   ☐ D. Performing necessary actions to minimize damage and protect lives and property.

GOVERNMENT RESPONSE TO A DISASTER DECLARATION KNOWLEDGE ASSESSMENT

5. After a disaster is declared by the President, FEMA assumes all financial responsibilities for recovery activities.

   ☐ True ☐ False

6. The Federal Response Plan is applicable only to natural disasters.

   ☐ True ☐ False

Instructions: Place a checkmark in the appropriate column to match each of the following actions to the level of government that has the primary responsibility. **NOTE:** You may check more than one level of government for each section.

	LOCAL	**STATE**	**FEDERAL**
Requesting Federal disaster assistance.			
Warning citizens of impending disasters.			
Developing an emergency operations plan.			
Mobilizing State resources to provide assistance.			
Evacuating citizens prior to an emergency or disaster.			
Conducting Preliminary Damage Assessments.			
Coordinating Federal, State, local, and voluntary agencies.			

GOVERNMENT RESPONSE TO A DISASTER DECLARATION KNOWLEDGE ASSESSMENT

7. Check who takes each of the following actions:

   A. Signs the declaration.

   ☐ President ☐ FEMA Director ☐ FEMA Regional Director/State Governor

   B. Signs the letter explaining that declaration is denied.

   ☐ President ☐ FEMA Director ☐ FEMA Regional Director/State Governor

   C. Signs the FEMA/State Agreement.

   ☐ President ☐ FEMA Director ☐ FEMA Regional Director/State Governor

8. Under the Federal Response Plan, ESFs report directly to their agency heads for direction regarding needed Federal response to the disaster.

   ☐ True ☐ False

9. ESF representatives work at the disaster site and are not part of the FEMA Headquarters Emergency Support Team.

   ☐ True ☐ False

10. The declaration process may be expedited.

   ☐ True ☐ False

GOVERNMENT RESPONSE TO A DISASTER DECLARATION KNOWLEDGE ASSESSMENT ANSWER KEY

1. Federal disaster assistance:

   ✓ **B. Supports efforts at the State and local levels.**

   The local government or State officials may at any time request assistance directly from a number of Federal agencies. When a disaster situation is beyond the capabilities of these resources, a Presidential declaration may be requested to authorize additional Federal assistance.

2. Under a State emergency declaration, the Governor is empowered to mobilize the National Guard and direct its efforts.

   ✓ **True.** Generally, Governors are granted the power to use all available resources needed to respond effectively and efficiently to the event.

3. As soon as an event occurs, the local and State governments work with FEMA to assess damages and determine if Federal assistance is required.

   ✓ **True.** FEMA, with State and local governments, makes a Preliminary Damage Assessment to determine the extent of the damages and the efforts needed for response and recovery operations.

4. The local government helps to protect citizens in an emergency by:

   ✓ **A. Activating its local emergency operations plan.**

   ✓ **B. Warning citizens.**

   ✓ **C. Reporting to State officials.**

   ✓ **D. Performing necessary actions to minimize damage and protect lives and property.**

5. After a disaster is declared by the President, FEMA assumes all financial responsibilities for recovery activities.

   ✓ **False.** FEMA provides assistance to supplement the assistance that State and local governments can provide.

GOVERNMENT RESPONSE TO A DISASTER DECLARATION KNOWLEDGE ASSESSMENT ANSWER KEY

6. The Federal Response Plan is applicable only to natural disasters.

✓ **False.** The Federal Response Plan is also implemented in technological emergencies and disasters, as well as other types of situations covered by the Stafford Act.

A checkmark appears in the appropriate column to match the following actions to the level of government that has the primary responsibility.

	LOCAL	**STATE**	**FEDERAL**
Requesting Federal disaster assistance.		✓	
Warning citizens of impending disasters.	✓		
Developing an emergency operations plan.	✓	✓	
Mobilizing State resources to provide assistance.		✓	
Evacuating citizens prior to an emergency or disaster.	✓		
Conducting Preliminary Damage Assessments.	✓	✓	✓
Coordinating Federal, State, local, and voluntary agencies.			✓

7. Check who takes each of the following actions:

A. Signs the declaration.

✓ **President** ☐ FEMA Director ☐ FEMA Regional Director/State Governor

B. Signs the letter explaining that declaration is denied.

☐ President ✓ **FEMA Director** ☐ FEMA Regional Director/State Governor

C. Signs the FEMA/State Agreement.

☐ President ☐ FEMA Director ✓ **FEMA Regional Director/State Governor**

GOVERNMENT RESPONSE TO A DISASTER DECLARATION KNOWLEDGE ASSESSMENT ANSWER KEY

8. Under the Federal Response Plan, ESFs report directly to their agency heads for direction regarding needed Federal response to the disaster.

   ✓ **False**

   ESFs work under the coordination of the FCO or other section chiefs. ESF team members may keep their agencies informed and involved in the process.

9. ESF representatives work at the disaster site and are not part of the FEMA Headquarters Emergency Support Team.

   ✓ **False**

   ESFs are an important part of both the Headquarters and local operations.

10. The declaration process may be expedited.

   ✓ **True**

   In catastrophic situations or disasters of National interest, the process can be expedited.

THE DISASTER FIELD OFFICE

OVERVIEW

When the President signs a disaster declaration, FEMA begins the process of providing assistance authorized by the Stafford Act. This act gives FEMA special hiring authority and the authorization to approve disaster response and recovery measures. FEMA may initiate assistance by establishing a Disaster Field Office (DFO) in or near the disaster area. This office serves as the central coordinating facility for joint Federal-State operations. The DFO is where the ERT is located and generally houses other Federal agencies and voluntary organizations involved in providing assistance.

FEDERAL COORDINATING OFFICER AND STATE COORDINATING OFFICER

Disaster assistance is managed jointly by a Federal Coordinating Officer (FCO) and a State Coordinating Officer (SCO). The FCO, the lead Federal official at the DFO, heads the ERT and leads and coordinates the timely delivery of all Federal disaster assistance to support State and local governments and to assist affected individuals. The FCO works together with the SCO to assess the most urgent needs, orchestrate Federal and State efforts, and devise strategies to meet the needs.

MAJOR DFO SECTIONS

The major sections of the ERT at the DFO are: Operations, Information and Planning (ESF-5), Logistics, and Administration. (See the organizational chart on page I-44.) The following descriptions provide an overview of the disaster field operation organizational structures and functions.

OPERATIONS

The Operations Section consists of a support staff and four branches: Operations Support, Human Services, Infrastructure Support, and Emergency Services.

Functions of this section include:

- ✦ Implementing the delivery of all Federal disaster services including Human Services and Infrastructure Support.
- ✦ Defining operational priorities.
- ✦ Providing mission assignment tracking and accountability (formal documents tasking other Federal agencies to perform work).
- ✦ Coordinating and controlling all resources necessary for the support of disaster response and recovery in the affected communities.

INFORMATION AND PLANNING (ESF-5)

The Information and Planning Section is comprised of four branches: Situation Status, Planning Support, Documentation, and Technical Services. Functions of this section include:

- Providing formal and informal briefings to the Regional Director and the FCO, and deploying personnel.
- Providing the initial situation assessment for the FCO and the ERT.
- Collecting and analyzing information critical to disaster operations.
- Facilitating short- and long-range planning.
- Establishing and maintaining a Situation Room.
- Preparing and disseminating routine and special reports.
- Providing planners access to specialized technical information.
- Providing mapping information.
- Producing all graphics and reports needed to support planning.
- Maintaining historical files and records.

LOGISTICS

The Logistics Section includes five branches: Supply, Resource Management, Information Services, Coordination and Planning, and Support Services. The Logistics Section is organized to:

- Consolidate logistics functions.
- Focus and streamline ordering activities.
- Control source selection.
- Improve resource tracking and movement.
- Streamline control of property.
- Staff up or down without an operational disruption.

ADMINISTRATION

The Administration Section is comprised of two branches: Personnel and Employee Services. The Administration section may be used to:

- Administer payroll and other payments.
- Provide administrative assistance.
- Oversee travel reimbursement.
- Provide training through the Disaster Field Training Organization (DFTO).

EMERGENCY RESPONSE TEAM (ERT) KEY FUNCTIONS

Three key functions of the ERT that FEMA employees should be familiar with are the Emergency Information and Media Affairs, Congressional Affairs, and Community Relations functions. Each of these functions has several responsibilities within the DFO.

- Emergency Information and Media Affairs

  The responsibilities of this function include:

  - Managing public education and public information.
  - Handling all media inquiries.

- Congressional Affairs

  This function is responsible for:

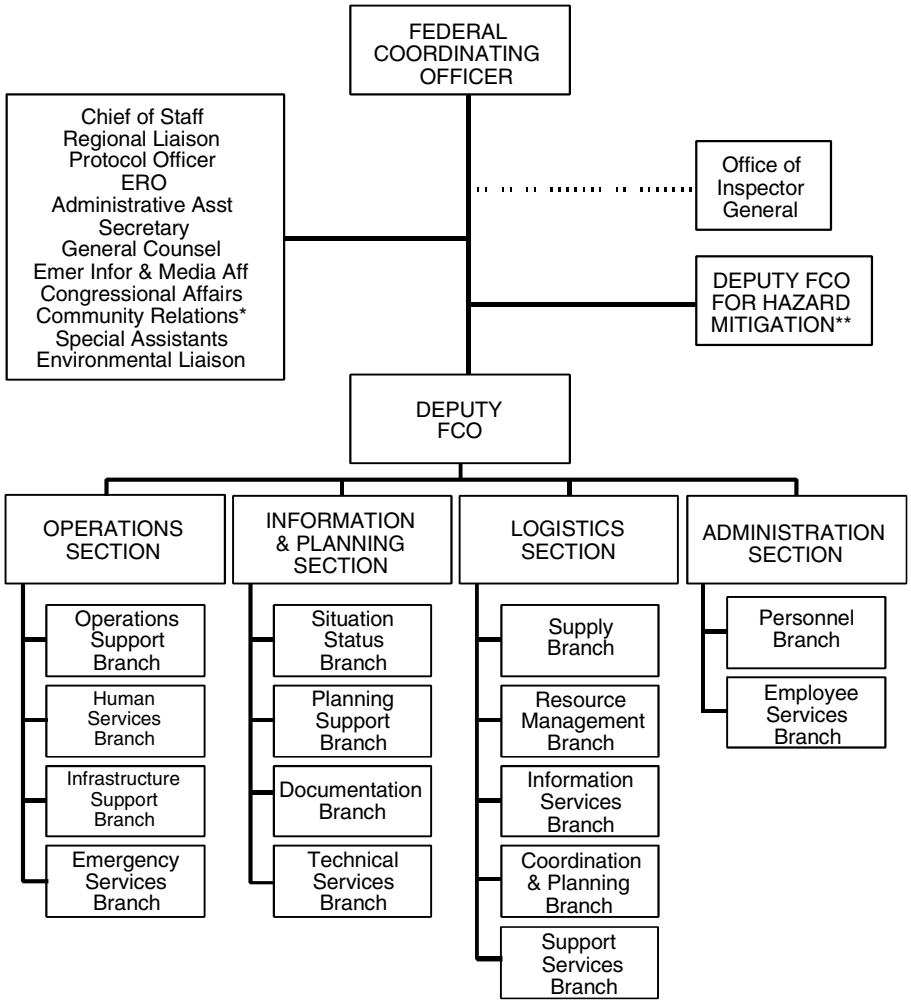
  - Serving as the primary point of contact for all congressional activities in the field during a disaster operation.
  - Functioning as the primary liaison for Members of Congress.
  - Responding to congressional inquiries on a constituent's behalf.

- Community Relations

  The responsibilities of this function include:

  - Providing visibility and establishing confidence of the local community in the emergency management process. Assessing critical community needs and resources.
  - Informing and educating the public on the disaster response processes and potential services.
  - Working with local groups to promote realistic expectations.

Emergency Response Team (ERT) Organizational Chart



Mobile Emergency Response Support (MERS) personnel will be named based on the location of the disaster.

*Position includes outreach.
** Operational responsibility for hazard mitigation only; no line responsibility for sections.

THE DISASTER FIELD OFFICE KNOWLEDGE ASSESSMENT

Instructions: Place a checkmark in the appropriate column to match each function description with the correct Disaster Field Office organizational unit, then check your answers against the answer key on page I-46. **NOTE:** The organizational units may be used more than once.

	OPERATIONS	INFORMATION AND PLANNING (ESF-5)	LOGISTICS	ADMINISTRATION	MEDIA AFFAIRS	COMMUNITY RELATIONS
Prepares and distributes the daily Situation Reports (SitReps).						
Provides computer support to the ERT.						
Manages the overall disaster budget.						
Coordinates and controls all resources necessary for the support of disaster response and recovery in the affected communities.						
Assesses community resources and needs.						
Supplies communications assistance to all disaster sites.						
Manages the Human Services and Infrastructure Support Programs.						
Administers payroll and other payments.						
Provides planning support for deployment.						
Writes press releases and handles media inquiries.						
Tracks mission assignments (formal taskings requesting other Federal agencies to perform work).						
Helps FEMA logisticians establish and furnish DFOs with essential equipment and supplies.						

THE DISASTER FIELD OFFICE KNOWLEDGE ASSESSMENT ANSWER KEY

A checkmark appears in the appropriate column to match the following function descriptions to the organizational unit that is responsible.

	OPERATIONS	INFORMATION AND PLANNING (ESF-5)	LOGISTICS	ADMINISTRATION	MEDIA AFFAIRS	COMMUNITY RELATIONS
Prepares and distributes the daily Situation Reports (SitReps).		✓				
Provides computer support to the ERT.			✓			
Manages the overall disaster budget.				✓		
Coordinates and controls all resources necessary for the support of disaster response and recovery in the affected communities.	✓					
Assesses community resources and needs.						✓
Supplies communications assistance to all disaster sites.			✓			
Manages the Human Services and Infrastructure Support Programs.	✓					
Administers payroll and other payments.				✓		
Provides planning support for deployment.		✓				
Writes press releases and handles media inquiries.					✓	
Tracks mission assignments (formal taskings requesting other Federal agencies to perform work).	✓					
Helps FEMA logisticians establish and furnish DFOs with essential equipment and supplies.			✓			

DISASTER ASSISTANCE PROGRAMS

OVERVIEW

The following types of disaster assistance will be discussed in this section:

- ✦ Human Services.
- ✦ Infrastructure Support.
- ✦ Mitigation.
- ✦ Assistance without a Presidential Declaration.

HUMAN SERVICES

When the President declares a major disaster, a wide range of assistance becomes available to individual disaster victims. Human Services programs may include all or some of the following, depending on the declaration:

- ✦ **Disaster Housing** is administered and funded by FEMA. Assistance may include the following:
  - ✧ **Transient accommodations**—Funding and/or reimbursement for such transient accommodations as hotels and motels.
  - ✧ **Home repair assistance**—Money to restore homes to a habitable condition. The monetary amount of assistance is based on the damages incurred, as determined by a FEMA inspection.
  - ✧ **Alternate housing assistance**—Households that are displaced from their homes for an extended period of time may receive alternate housing assistance in one of the following forms:
    - 6 Rental assistance—For renters and homeowners whose primary residences are designated uninhabitable as a result of a disaster. Pre-disaster renters receive 1 month's rental assistance; homeowners receive 3 months' rental assistance.
    - 6 Manufactured housing—Mobile homes or travel trailers may be placed on private, commercial, or group sites **as a last resort** if local housing resources are unavailable. This program will be administered by the States.
  - ✧ **Mortgage and rental assistance**—For those who have received a written notice of foreclosure or eviction as a result of financial hardship created by the disaster.

- ✦ **Disaster Unemployment Assistance** and job placement assistance are available for people who have become unemployed as a result of the disaster and who are not eligible for regular unemployment insurance benefits. These types of assistance are administered by the U.S. Department of Labor through the State Employment Security Agency; however, FEMA provides the funding.

HUMAN SERVICES

- **Individual and Family Grants (IFG)** are administered by the State. The IFG program is funded 75 percent by FEMA and 25 percent by the State.
  - This program provides grants through a designated State agency to meet disaster-related serious needs and necessary expenses not covered by other Governmental assistance programs, insurance, or other means.
  - IFG funds may be provided under the following categories:
    - Medical expenses
    - Transportation expenses
    - Home repair
    - Replacement of essential personal property
    - Funeral expenses
    - Protective measures
    - Other necessary expenses caused by the disaster

- **Legal Services** are available to low-income families and individuals. This assistance is administered by the Young Lawyers Division (YLD) of the American Bar Association. Legal services available include free legal counseling to low-income persons for disaster-related problems that may include replacing legal documents, transferring titles, contracting problems, will probate, or insurance problems.
- **Crisis Counseling** assistance is:
  - Funded by FEMA through the National Institute of Mental Health grant system. The American Red Cross or other local providers may offer crisis counseling services.
  - Available only after special request by the Governor and approval by FEMA.
  - Provided in the form of referral services and short-term counseling for mental health problems caused or aggravated by the disaster.

- **Disaster Loans** are available for homeowners, renters, business owners, and nonprofit organizations. This program is administered and funded by the Small Business Administration (SBA).
  - Following a Presidential declaration of a major disaster for Individual Assistance, this program is activated by the SBA Administrator or the Secretary of Agriculture (for Economic Injury Disaster Loans only).
  - Those eligible for the program are individuals and businesses located in counties included in the Presidential disaster declaration. In the event of an SBA administrative disaster declaration or a disaster declaration by the Secretary of Agriculture, individuals or businesses located in counties adjacent to those declared may also apply for certain types of disaster loans.
  - The types of disaster loans available are:
    - Home Loans
    - Business Loans
    - Economic Injury Disaster Loans

HUMAN SERVICES

- **Agricultural Assistance** includes:
  - Technical assistance.
  - Payments to cover portions of the cost to eligible farmers who perform emergency conservation actions on farm lands damaged by the disaster.
  - Provision of federally-owned feed grain for livestock and herd preservation.
- **Veterans Assistance** available includes death benefits, pensions, insurance settlements, and adjustments to home mortgages held by the Department of Veterans Affairs (VA) if a VA-insured home has been damaged.
- **Tax Assistance** is available from the Internal Revenue Service (IRS). This assistance is activated by a Presidential declaration of a major disaster.
  - The IRS provides assistance in the form of free Federal income tax information and tax return preparation. A package of tax forms and publications pertaining to casualty losses (a Disaster Kit) is available free of charge.
  - Assistance also includes expediting income tax refunds.
- The **Cora Brown Fund** is available to assist victims of natural disasters with those disaster-related needs that have not or will not be met by Government agencies or private organizations.

INFRASTRUCTURE SUPPORT

Following a Presidential disaster declaration, the State, assisted by FEMA, will conduct sessions called Applicant Briefings for State, local, and private nonprofit officials to describe:

- The types of assistance available under the declaration.
- The means by which those funds are provided for eligible disaster assistance projects.

Applicants must submit a Request for Public Assistance within 30 days after the area is designated eligible for assistance. Project Worksheets are prepared for each project to identify damage that may be eligible for assistance, to determine the extent of the damage, and to estimate the cost for repairs. If an applicant is eligible, assistance is normally granted on a 75 percent Federal/25 percent State and local cost-sharing basis. The State then administers the funds. Eligible applicants within the designated disaster areas include:

- States.
- Political subdivisions of States.
- Native American tribes or authorized tribal organizations.
- Alaska Native villages and organizations.
- Qualifying private nonprofit institutions or organizations.

INFRASTRUCTURE SUPPORT

The Public Assistance program provides flexibility for States to manage their recovery. The program helps pay for work or expenses that are a direct result of the declared incident and that are the legal responsibility of the applicant. The program provides assistance for repairs to or replacement of damaged structures and restoration of qualified public facilities. Types of work included under the Infrastructure Support program are as follows:

- Debris removal.
- Emergency protective measures to save lives, protect property, and preserve public health and safety.
- Repair or replacement of roads, streets, and bridges.
- Repair or replacement of qualified public facilities and related equipment.
- Repair or replacement of public utilities.
- Repair and restoration of recreational facilities and parks *except* when they are owned by a private nonprofit or for-profit group.

MITIGATION

Mitigation is defined as:

Any action taken to eliminate or reduce the long-term risk to human life and property from natural hazards.

Mitigation actions are accomplished by:

- **Acting on the hazard.** Seeding hurricanes or triggering avalanches may eliminate a hazard before a disaster occurs.
- **Redirecting the hazard.** A seawall or dune restoration program helps keep water away from people by redirecting the impact areas away from vulnerable locations.
- **Interacting with the hazard.** Seismic safety provisions incorporated into building codes result in structures that are more able to withstand impacts and earthquakes.
- **Avoiding the hazard.** River corridor projects create multiple beneficial uses of the floodplain while relocating structures to less vulnerable locations.

FEMA provides technical assistance and grants for mitigation projects and activities. Mitigation involves identifying and implementing measures to reduce the severity of future disasters. Mitigation assistance includes:

- Technical assistance and guidance in preparing or updating the required State Hazard Mitigation Plan.
- Technical assistance from Interagency Hazard Mitigation Teams or Hazard Mitigation Survey Teams. These teams survey the area following a disaster declaration to identify mitigation measures that may reduce future damages.
- Funding of mitigation projects through the Hazard Mitigation Grant Program (HMGP), which can fund up to 75 percent of the cost of the project by FEMA.

MITIGATION

The HMGP provides funding for mitigation measures that substantially reduce the risk of future damages. The measures funded must be cost-effective and environmentally compatible, and should be identified through the evaluation of hazards when preparing the State Hazard Mitigation Plan. Total Federal funds available for the HMGP are limited to an amount equal to 15 percent of the Federal share of the total disaster expenditures.

The State serves as the grantee for the program with overall financial and program management responsibilities.

Eligible applicants for the grants include State agencies, local units of government, tribes, and certain private nonprofit organizations.

FLOOD MITIGATION ASSISTANCE (FMA)

The **Flood Mitigation Assistance (FMA)** program's intent is to provide funding on an annual basis for States that are planning or taking mitigative measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other insurable structures.

FMA was developed to:

- ✦ Reduce the flood hazard for insurable structures under the National Flood Insurance Program (NFIP).
- ✦ Address repetitive loss claims.

Funding for FMA is drawn from the NFIP and does not draw reserves from the President's Disaster Relief Fund.

Under FMA, grants can be awarded for:

- ✦ Planning assistance.
- ✦ Implementation of actual mitigation projects.
- ✦ Technical assistance.

FMA differs from the HMGP in that FMA grants are made on an annual basis.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

Until the late 1960s, most property owners were unable to get insurance against flood damage. Private insurance firms, aware of the potential for catastrophic losses, were unwilling to assume the financial risk alone. This put the burden on taxpayers to provide costly disaster relief to a growing number of flood victims.

In 1968, Congress addressed this issue by creating the National Flood Insurance Program (NFIP). This Federal program provided flood insurance at a reasonable cost in exchange for the careful management of flood-prone areas by local communities.

Today, the NFIP serves over 2 million policyholders across the country. It is administered by FEMA.

Everyone in a participating community of the NFIP can buy flood insurance. Nationwide, more than 18,000 communities have joined the program. In some instances, people have been told that they cannot buy flood insurance because of where they live. To clear up this and other misconceptions about Federal flood insurance, the NFIP has compiled the following list of common myths about the program.

✦ **Myth:** You can't buy flood insurance if you are located in a high-risk flood area.

Fact: You can buy Federal flood insurance no matter where you live if your community belongs to the NFIP, except in the Coastal Barrier Resources System (CBRS) areas. The program was created in 1968 to provide affordable flood insurance to people who live in areas with the greatest risk of flooding, called Special Flood Hazard Areas (SFHAs).

In fact, under the National Flood Insurance Act, lenders must require borrowers whose property is located with an SFHA to purchase flood insurance as a condition of receiving a federally-backed mortgage loan. There is an exemption for conventional loans on properties within CBRS areas. Lenders should notify borrowers that their property is located in an SFHA and that affordable Federal flood insurance is available.

✦ **Myth:** You can't buy flood insurance immediately before or during a flood.

Fact: You can purchase flood coverage at any time. There is a 30-day waiting period after you've applied and paid the premium before the policy is effective, with the following exceptions: 1) If the initial purchase of flood insurance is in connection with the making, increasing, extending, or renewing of a loan, there is no waiting period. The coverage becomes effective at the time of the loan, provided application and presentment of premium are made at or prior to loan closing. 2) If the initial purchase of flood insurance is made during the 1-year period following the issuance of a revised flood map for a community, there is a 1-day waiting period. The policy does not cover a "loss in progress," defined by the NFIP as a loss occurring as of 12:01 a.m. on the first day of the policy term. In addition, you cannot increase the amount of insurance coverage you have during a loss in progress.

✦ **Myth:** Homeowners' insurance policies cover flooding.

Fact: Unfortunately, many homeowners do not find out until it is too late that their homeowners' policies do not cover flooding. Federal flood insurance protects your most valuable assets—your homes and belongings.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

✦ **Myth:** Flood insurance is only available for homeowners.

Fact: Flood insurance is available to protect homes, condominiums, apartments, and nonresidential buildings, including commercial structures. A maximum of $250,000 of building coverage is available for single-family residential buildings; $250,000 per unit for multifamily residences. The limit for contents coverage on all residential buildings is $100,000, which is also available to renters. Commercial structures can be insured to a limit of $500,000 for the building and $500,000 for the contents.

✦ **Myth:** You can't buy flood insurance if your property has been flooded.

Fact: It doesn't matter how many times your home, apartment, or business has flooded. You are still eligible to purchase flood insurance, provided that your community is participating in the NFIP.

✦ **Myth:** Only residents of high-risk flood zones need to insure their property.

Fact: Even if you live in an area that is not flood-prone, it is advisable to have flood insurance. One-third of the NFIP's claims come from outside high-risk flood areas. The NFIP's Preferred Risk Policy, available for as little as $80 per year, is designed for residential properties located in low-to-moderate flood risk zones.

✦ **Myth:** The NFIP does not offer any type of basement coverage.

Fact: Yes it does. The NFIP defines a basement as any area of a building with a floor that is *subgrade*, or below ground level on all sides. Basement coverage under an NFIP policy includes cleanup expenses and items used to service the building, such as elevators, furnaces, water heaters, washers, dryers, air conditioners, freezers, utility connections, circuit-breaker boxes, pumps, and tanks used in solar energy systems. The policy does not cover the contents of a finished basement and improvements such as finished walls, floors, or ceilings.

Other uninsurable items are water wells, septic systems, and access routes.

✦ **Myth:** Federal disaster assistance will pay for flood damage.

Fact: Before a community is eligible for disaster assistance, it must be declared a Federal disaster area. Federal disaster assistance declarations are awarded in less than 50 percent of flooding incidents. The annual premium for an NFIP policy, averaging about $300 per year, is less expensive than interest on Federal disaster loans, even though they are always granted on favorable terms. Furthermore, if you are uninsured and receive Federal disaster assistance after a flood, you must purchase flood insurance to receive disaster relief in the future.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

✦ **Myth:** The NFIP encourages coastal development.

Fact: One of the NFIP's primary objectives is to guide development away from high-risk flood areas. NFIP regulations minimize the impact of structures that are built in SFHAs by requiring them not to cause obstructions to the natural flow of floodwaters. Also, as a condition of community participation in the NFIP, those structures built within SFHAs must adhere to strict floodplain management regulations. In addition, the Coastal Barrier Resources Act (CBRA) of 1982 relies on the NFIP to discourage building in the fragile coastal areas covered by CBRA by prohibiting the sale of flood insurance in designated CBRA areas. These laws do not prohibit property owners from building along coastal areas; however, they do transfer the financial risk of such building from Federal taxpayers to those who choose to live or invest in these areas.

✦ **Myth:** Federal flood insurance can only be purchased through the NFIP directly.

Fact: Federal flood insurance is sold and serviced directly through the NFIP or through a Write Your Own (WYO) company. WYO companies write and service policies on a nonrisk-bearing basis through a special arrangement with the Federal Insurance Administration.

✦ **Myth:** The NFIP does not cover flooding resulting from hurricanes or the overflow of rivers or tidal waters.

Fact: The NFIP defines covered flooding as a general and temporary condition during which the surface of normally dry land is partially or completely inundated. Two adjacent properties or two or more acres must be affected. Flooding can be caused by any one of the following:

- ✧ The overflow of inland or tidal waters.
- ✧ The unusual and rapid accumulation or runoff of surface waters from any source, such as heavy rainfall.
- ✧ The incidence of mudslides or mudflows, caused by flooding, which are comparable to a river of liquid or flowing mud.
- ✧ The collapse or destabilization of land along the shore of a lake or other body of water, resulting from erosion or the effect of waves, or water currents exceeding normal, cyclical levels.

✦ **Myth:** Wind-driven rain is considered flooding.

Fact: No, it isn't. Rain entering through wind-damaged windows, doors, or a hole in a wall or the roof, resulting in standing water or puddles, is considered windstorm, rather than flood damage. Federal flood insurance only covers damage caused by the general condition of flooding (defined above), typically caused by storm surge, wave wash, tidal waves, or the overflow of any body of water above normal, cyclical levels. Buildings that sustain this type of damage usually have a watermark, showing how high the water has risen before it subsides. Although the Standard Flood Insurance Policy (SFIP) specifically excludes wind and hail coverage, most homeowners' policies provide coverage.

For more information about the NFIP, ask your insurance agent or company, or call the NFIP's toll-free number at 1-800-611-6123, extension 29.

PROJECT IMPACT AND DISASTER-RESISTANT COMMUNITIES

As a result of the increasing number and severity of disasters over the last decade, FEMA has introduced a new project (not a program) to reduce the damage resulting from hurricanes, tornadoes, severe storms, floods, and fires.

With Project Impact, FEMA is changing the way America deals with disasters. Project Impact will help communities protect themselves from the effects of natural disasters by taking actions to reduce disruption and loss.

Project Impact operates on a common-sense damage-reduction approach and is based on three simple principles:

- **Preventive actions must be decided at the local level.** FEMA cannot make prevention an everyday activity. Local communities must get involved.
- **Private sector participation in mitigation efforts is vital.** Historically, local businesses are disrupted by disasters—even if they are not damaged directly by the event. Disruption of utilities and lost productivity from workers whose properties have been damaged has cost local businesses millions of dollars.
- **Long-term effort and investment in prevention measures are essential.** Disaster resistance cannot happen overnight. It will take both long-term effort and investment from community and business to work.

Under Project Impact, FEMA offers expertise and technical assistance from both the Federal and regional levels to provide local governments with information and techniques on the latest mitigation practices.

Under Project Impact, FEMA will:

- Invite at least one community in each of the 50 States to participate in the program by the end of fiscal year 1998.
- Recruit 500 businesses to be Project Impact partners in that timeframe.

A disaster-resistant community is one that:

- Experiences minimal loss of life as a result of a disaster.
- Has limited interruption of public services.
- Can resume business operations in a timely manner following a disaster.
- Can manage its response operations with or without State assistance.
- Returns to pre-disaster conditions in a timely, orderly manner.

PROJECT IMPACT AND DISASTER-RESISTANT COMMUNITIES

The initiative is designed to help locals understand their risks, identify their priorities through a community-driven process, take action to reduce their risks, and communicate their successes to others.

The incentive to participate in Project Impact is clear:

- A disaster-resistant community is able to recover more quickly with less property loss and lower cost for repairs.
- Time lost from productive activity is minimized for both businesses and their employees.

Mitigation programs, such as HMGP and FMA, and projects, such as Project Impact, help State and local governments make huge inroads to mitigating disaster efforts.

ASSISTANCE WITHOUT A PRESIDENTIAL DECLARATION

In many instances, disaster assistance is available from the Federal Government and voluntary agencies without a Presidential declaration of a major disaster or an emergency. Federal establishments, particularly military installations that are located in or near a disaster area, may provide immediate lifesaving assistance. Other Federal agencies may be able to provide assistance under their own statutory authorities. The following assistance is available from various Federal and voluntary agencies:

- **Search and Rescue.** The U.S. Coast Guard or the U.S. Armed Forces may assist in search and rescue operations, evacuate disaster victims, and transport supplies and equipment.
- **Flood Protection.** The U.S. Army Corps of Engineers (USACE) has the authority to assist in flood-fighting and rescue operations and to protect, repair, and restore certain flood-control works that are threatened, damaged, or destroyed by a flood. The USACE also has the authority to assist States for a 10-day period subject to specific criteria.
- **Fire Suppression Assistance.** The Stafford Act authorizes the President to provide assistance—including grants, equipment, supplies, and personnel—to a State for the suppression of a forest fire or a grassland fire on public or private lands that threatens to become a major disaster. The Governor or the Governor's Authorized Representative must request such assistance through the FEMA Regional Director and should support the request with detailed information on the nature of the threat and the Federal assistance needed.
- **Heath and Welfare.** The Department of Health and Human Services may provide assistance to State and local welfare agencies and to State vocational rehabilitation agencies. The Public Health Service can aid States and local communities in emergency health and sanitation measures. The Food and Drug Administration may work with State and local governments in establishing public health controls through decontamination or condemnation of contaminated food and drugs.
- **Emergency Conservation Program.** The State Director may designate areas for the Farm Service Agency (formerly the Agriculture Stabilization and Conservation Service), administered by the U.S. Department of Agriculture. This program provides for cost-sharing grants to rehabilitate farm lands damaged by natural disasters.
- **Emergency Loans for Agriculture.** Rural Economic and Community Development may make emergency loans to farmers, ranchers, and aquaculturalists in areas designated as eligible by its Administrator or the Secretary of Agriculture.

ASSISTANCE WITHOUT A PRESIDENTIAL DECLARATION

- **Disaster Loans for Homeowners and Businesses.** The Small Business Administration (SBA) can provide both direct and bank-participation disaster loans to qualified homeowners and businesses to repair or replace damaged or destroyed private property when the Administrator declares a disaster loan area under the SBA's statutory authority. Economic injury loans can help small firms suffering economic losses as a direct result of a disaster.
- **Tax Refunds.** The Internal Revenue Service can assist individuals in applying for casualty losses resulting from natural disasters
- **Repairs to Federal Aid System Roads.** The Federal Highway Administration of the Department of Transportation can provide assistance to restore roads and bridges on the Federal Aid System.
- **Voluntary Organization Assistance.** An essential element in almost every disaster relief effort is the assistance provided by Voluntary Organizations Active in Disasters (VOADs). VOADs often provide help when all other official avenues have been exhausted.

  - Voluntary organization assistance includes:
    - **Emergency Mass Care**, which may be provided by the American Red Cross and the Salvation Army.
    - **Individual Assistance**, which may be provided by the American Red Cross, includes food, clothing, household furniture, prescriptions, funeral expenses, and occupational supplies and equipment.
    - A **Voluntary Agency Liaison** officer, who is provided by the American Red Cross, to assist FEMA in coordinating with all the VOADs functioning within the disaster area.
  - Other VOADs and the types of assistance they provide are as follows:
    - The Salvation Army—Provides food, clothing, donated furniture, and ministerial services.
    - Seventh Day Adventist—Provides used clothing that has been cleaned, sorted, labeled, and packaged for individuals.
    - Mennonite Disaster Service, Southern Baptist Convention, Church of the Brethren, Christian Reformed World Relief Committee—Provide assistance in cleanup activities and temporary repairs to owner-occupied homes.
    - Southern Baptist Convention and Church of the Brethren—Provide safe, quality child-care services.
    - Society of St. Vincent DePaul—Assists in the distribution of donated items.
    - Church World Service—Assists in the development of a Church Interfaith Committee to utilize donated church funds to provide for various unmet needs.

- **Department of Defense Predeclaration Emergency Assistance.** The Stafford Act authorizes the President to use personnel and equipment of the Department of Defense to remove debris or provide temporary restoration of essential public facilities and services in the aftermath of an incident that may ultimately qualify for a major disaster or emergency declaration. This authority has been delegated to the Associate Director of the Response and Recovery Directorate.

ASSISTANCE WITHOUT A PRESIDENTIAL DECLARATION

The Governor must request such assistance through the FEMA Regional Director and support the request with a finding that such work is essential for the preservation of life and property. When authorized, the work may be carried out only for a period not to exceed 10 days.

CUSTOMER SERVICE

FEMA's main goal is to help people affected by disasters begin their recovery from a disaster. Effective customer service helps ensure that they are able to move forward with their lives. When individuals have confidence that the Government is working, they are better able to begin to put their lives back together.

FEMA has identified the following standards to ensure quality customer service:

To help customers, FEMA will . . .

- ✦ Provide customers equal access to disaster assistance.
- ✦ Provide customers an opportunity to tell their stories to a responsive FEMA representative.
- ✦ Treat customers with respect and caring.
- ✦ Provide customers with clear, accurate information about available assistance and how to apply for it.
- ✦ Explain clearly what customers need to do after applying for assistance, what customers can expect from Government agencies, and how long the process should take.
- ✦ Provide customers with disaster housing assistance as promptly as possible and give them an estimate of when they will receive assistance.
- ✦ Advise customers on how to protect against future losses.
- ✦ Use customers' suggestions and complaints to improve services continually.

DISASTER ASSISTANCE PROGRAMS KNOWLEDGE ASSESSMENT

Instructions: This short exercise will help you assess your current understanding of Disaster Assistance Programs. Please provide the correct response(s) for each question, then check your answers against the answer key on pages I-62 and I-63.

1. Following a Presidential declaration of a major disaster or emergency, what three types of Federal disaster assistance become available?

   _____

   _____

   _____

2. Disaster Housing, Individual and Family Grants, and Tax Assistance are in which category of disaster assistance?

   _____

3. Crisis Counseling services are available only after special request by the Governor and approval by which Federal agency?

   _____

4. Disaster Loans are available for homeowners, renters, business owners, and nonprofit organizations. This program is administered and funded by which Federal agency?

   _____

5. Name the three types of disaster loans that are available.

   _____

   _____

   _____

DISASTER ASSISTANCE PROGRAMS KNOWLEDGE ASSESSMENT

6. The Federal Government grants 75 percent of the Public Assistance Program funding to the State. Does the Federal Government or the State administer these funds?

   _____

7. Eligible applicants for Public Assistance must submit a Request for Public Assistance within _____ days after the area is designated eligible for assistance.

8. Write the definition of Mitigation below.

   _____

   _____

   _____

9. Total Federal funds available for the Hazard Mitigation Grant Program (HMGP) are limited to _____ percent of the Federal share of permanent restorative work completed using Infrastructure Support funding.

10. Mitigation actions are accomplished by:

    - Acting on the hazard.
    - Redirecting the hazard.
    - Interacting with the hazard.

    Name the fourth action:

    _____

11. In many instances, disaster assistance is available from the Federal Government and voluntary agencies without a Presidential declaration of a major disaster or an emergency. Name three types of assistance that are available without a declaration.

    _____

    _____

    _____

DISASTER ASSISTANCE PROGRAMS KNOWLEDGE ASSESSMENT

12. What are two important types of assistance provided by Voluntary Organizations Active in Disasters (VOADs)?

    _____

    _____

13. Which VOAD provides a Voluntary Agency Liaison officer to assist FEMA in coordinating with all the VOADs functioning within the disaster area?

    _____

14. What percentage of claims received by the National Flood Insurance Program come from outside high-risk flood zones?

    - ☐ 5%
    - ☐ 15%
    - ☐ 33%
    - ☐ 50%

15. Homeowner's insurance policies cover flooding.

    ☐ True ☐ False

DISASTER ASSISTANCE PROGRAMS KNOWLEDGE ASSESSMENT ANSWER KEY

1. Following a Presidential declaration of a major disaster or emergency, the three types of Federal disaster assistance that become available include **Human Services, Infrastructure Support,** and **Mitigation**.

2. Disaster Housing, Individual and Family Grants, and Tax Assistance are in the **Human Services** category of disaster assistance.

3. Crisis Counseling services are available only after special request by the Governor and approval by the **Federal Emergency Management Agency.**

4. The Disaster Loans program is administered and funded by the **U.S. Small Business Administration (SBA).**

5. The three types of disaster loans available are:

   ✓ **Home Loans**

   ✓ **Business Loans**

   ✓ **Economic Injury Disaster Loans**

6. The Federal Government grants 75 percent of the Public Assistance Program funding to the State. The **State** then administers these funds.

7. Eligible applicants for Public Assistance must submit a Request for Public Assistance within **30** days after the area is designated eligible for assistance.

8. Mitigation is defined as:

   ✓ **Any action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards**.

9. Total Federal funds available for the Hazard Mitigation Grant Program are limited to **15 percent** of the Federal share of the total disaster expenditures.

DISASTER ASSISTANCE PROGRAMS KNOWLEDGE ASSESSMENT ANSWER KEY

10. Mitigation actions are accomplished by:

    Acting on the hazard.
    Redirecting the hazard.
    Interacting with the hazard.

    ✓ **Avoiding the hazard.**

11. In many instances, disaster assistance is available from the Federal Government and voluntary agencies without a Presidential declaration of a major disaster or an emergency. Assistance available without a declaration includes any three from the list below:

    ✓ **Search and Rescue**
    ✓ **Fire Suppression**
    ✓ **Emergency Conservation**
    ✓ **Disaster Loans for Homeowners and Businesses**
    ✓ **Tax Refunds**
    ✓ **Department of Defense Predeclaration Emergency Assistance**
    ✓ **Flood Protection**
    ✓ **Health and Welfare**
    ✓ **Emergency Loans for Agriculture**
    ✓ **Repairs to Federal Aid System Roads**
    ✓ **Voluntary Agency assistance**

12. The two most important types of assistance provided by Voluntary Organizations Active in Disasters (VOADs) are:

    ✓ **Emergency Mass Care**
    ✓ **Individual Assistance**

13. The **American Red Cross** is the VOAD that provides a Voluntary Agency Liaison officer to assist FEMA in coordinating with all the VOADs functioning within the disaster area.

14. What percentage of claims received by the National Flood Insurance Program come from outside high-risk flood zones?

    ✓ 33%

15. Homeowner's insurance policies cover flooding.

    ✓ False

II. Planning For and Identifying Community Hazards

HAZARDOUS WEATHER FACT SHEETS

INTRODUCTION

This section contains fact sheets on the most common hazardous weather events that occur in the United States. Each fact sheet includes:

- ✦ A definition of the event.
- ✦ Characteristics common to the event, including hazards and dangers.
- ✦ Historical examples of the types and amounts of damage that each event may cause.

As you review the potential hazards, consider:

- ✦ Which hazards are most likely to occur in your community?
- ✦ What types of damage are the hazards likely to cause?
- ✦ Which area(s) of your community are likely to be hardest hit?
- ✦ How does your community's Emergency Operations Plan (EOP) address the response needs created by these hazards?
- ✦ If an incident occurred, what assistance would your community require from:
    - ✧ Mutual aid partners?
    - ✧ The State?
    - ✧ FEMA?

Answering these questions will help you to be prepared better for your community's emergency planning process.

Refer to this section during your planning process or when you want to know about a specific event and the danger that it potentially poses to your community.

THUNDERSTORMS

DEFINITION

A thunderstorm is a local storm produced by a cumulonimbus cloud and is always accompanied by lightning and thunder. Thunderstorms also are accompanied often by gusty winds, heavy rain, and occasionally by hail. Thunderstorms sometimes may be violent at the surface. Thunderstorms may be classified as ordinary, approaching severe (or non-severe), or severe. Thunderstorm categories, as classified by wind speed and precipitation, are shown in the table below.

CATEGORY	*WIND SPEED*	*PRECIPITATION*
Ordinary	< 35 knots (40 m.p.h.)	Variable
Approaching Severe	≥ 35 knots (40 m.p.h.)	Hail > ½ inch
Severe	≥ 50 knots (58 m.p.h.)	Hail ≥ 3/4 inch

CHARACTERISTICS

The characteristics of thunderstorms depend on the type of storm that develops. To understand the differences in the types of storms, a brief discussion on the ingredients and stages is necessary.

Three basic factors contribute to thunderstorm development: moisture, instability, and lift.

- **Moisture** comes from large bodies of water (e.g., oceans, bays, the Great Lakes) or possibly from large vegetation areas.
- **Instability** is related to the rate at which temperature decreases with height and moisture content of the air. The NWS uses Lift Index (LI) and Convective Available Potential Energy (CAPE) to measure instability. The more unstable the air mass, the more severe the thunderstorm.
- **Lift** can be caused by fronts, sea breezes, heat rising from the Earth's surface, outflow boundaries from prior thunderstorms, or dry line boundaries. Lift brings warm air up through the air mass.

CHARACTERISTICS

These factors combine to develop into thunderstorms in three stages.

- **Developing Stage:** A towering cumulus cloud forms as air rises. The cloud extends to about 20,000 feet above the level of freezing temperatures. Usually there is little if any rain, but occasional lightning occurs during this stage, which lasts about 10 minutes.
- **Mature Stage:** During this stage, the storm builds to heights of 40,000 feet or more. This is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. The storm occasionally has a black or dark green appearance. The mature stage lasts an average of between 10 and 20 minutes, but may last much longer.
- **Dissipating Stage:** Downdrafts begin to choke off the supply of air that feeds the storm, the storm stops building, loses height, and dissipates. Rainfall decreases in intensity, but some thunderstorms produce a burst of strong winds in this stage, and lightning remains a danger.

Thunderstorms are categorized into four types.

- **Single Cell:** Single-cell thunderstorms are short lived (i.e., generally lasting 20-30 minutes or less) and are stifled by intensifying downdrafts. These storms are relatively uncommon and cover a limited area (i.e., only a few square miles).
- **Multicell:** Multicell storms are most common. A multicell storm is an organized cluster of two or more single-cell storms. Air flowing out of one storm fuels other storms, causing new cells to develop on the right or right-rear storm flank every 5 to 15 minutes.
- **Squall lines:** A line or narrow band of active thunderstorms, a squall line may extend over 250 to 500 miles, may be from 10 to 20 miles wide, and consist of many laterally aligned cells that do not interfere with one another. The cells may be ordinary, non-severe, or severe, and they may be multicell, supercell, or a combination of these. Squall-line storms may form along cold fronts but often form as much as 100 miles ahead of an advancing cold front in the warm sector of an extratropical storm. They often trail a large, flat cloud layer that brings significant rain after the storms pass.
- **Supercell:** Supercells are relatively uncommon but produce the most severe and longest lasting (1 to 6 hours) weather. Supercells can travel 200 miles or more. These storms can cause strong winds of more than 78 m.p.h, giant hail (e.g., 2 inches), and significant tornado activity. Supercells produce updrafts of between 56 and 112 m.p.h. that coexist with sustained downdrafts. Together, the updrafts and downdrafts act to extend the storm's duration.

CHARACTERISTICS

The NWS uses the Lift Index (LI) and Convective Available Potential Energy (CAPE) to indicate atmospheric instability, which is a measure of the potential severity of a thunderstorm.

- ✦ The greater the instability, the more severe the thunderstorm.
- ✦ LIs with greater negative numbers indicate a greater degree of instability.
- ✦ CAPE is a positive number—the higher the number, the greater the instability.

Thunderstorms most often occur in the spring and summer, during the afternoon and evenings, but can occur at any time.

Hazards associated with thunderstorms include:

- ✦ Lightning.
- ✦ Hail.
- ✦ Damaging winds.
- ✦ Heavy rain causing flash flooding.
- ✦ Tornadoes.
- ✦ Fires caused by lightning produced by dry thunderstorms.

The damaging winds of thunderstorms include straight-line winds, downbursts, and micro bursts.

- ✦ Straight-line winds are high winds across a wide area.
- ✦ Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground.
- ✦ Micro bursts are minimized downbursts covering an area of less than 2.5 miles across. They induce a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Micro bursts may or may not include precipitation and can produce winds over 150 m.p.h.

HISTORICAL EXAMPLES

- ✦ In May 1995, a hailstorm in Dallas, Texas dropped softball-sized hail, damaging more than 100 planes at the Dallas-Fort Worth Airport and causing $750 million in damage, 510 injuries, and 21 deaths.
- ✦ In April 1974, treacherous thunderstorms developed in the Midwest. Cold, dry air pushed east by a low-pressure center east of the Rockies; an extratropical storm bringing warm, humid air north from the Gulf; the jet stream winds bringing dry air from Texas; and cool, humid air in the Northeast set up the storms. The storms caused 127 tornadoes, the largest, most damaging tornado outbreak in U.S. history. More than 300 people were killed, 6,142 were injured, and damage was estimated at $600 million.

PRODUCTS

The table below and on the next pages lists NWS products that can provide planning and preparedness information on thunderstorms. Refer to the fact sheets on coastal floods, extratropical coastal cyclones, tornadoes, and riverine floods for other products.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks			
Convective Outlook Day 2	MKCSWODY2	Storm Prediction Center (SPC)	Forecast for severe thunderstorms for the contiguous 48 States for the next day (DY2) and that day (DY1). Includes areas, degree of risk or probability, hazards, and severity.
Convective Outlook Day 1	MKCSWODY1	SPC	
Public Weather Outlook	MKCPWOMKC	SPC	Discussion of an especially significant and/or widespread outbreak of severe thunderstorms.
Severe Weather Outlook	___SPS___	Local NWS Office	This is a local outlook for the potential of severe weather. It includes hazards, locations, severity, and timeframes.
Watches			
Severe Thunderstorm Watch	MKCSEL (1-9)*	SPC	A watch contains: ✦ Type of severe weather. ✦ Watch area. ✦ Valid period. ✦ Type of severe weather possible. ✦ Intensity of severe weather. ✦ Watch axis. ✦ Meaning of the watch. ✦ Call-to-action statements. ✦ Discussion of meteorological reasoning. ✦ Other watch information.
Watch Cancellation	MCKSEL (1-9)*		This product cancels a severe thunderstorm watch.

*1-9 indicates the consecutive number of the issuance for the day.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Statements			
Severe Thunderstorm Watch Redefining Statement	___SLS___	Local NWS Office	Provides geographical or areal redefinition of a specific watch area including States, counties, and cities at risk.
Special Weather Statement	___SPS___	Local NWS Office	Provides for clearance of counties from local severe thunderstorm watches.
Severe Weather Statement	___SVS___	Local NWS Office	Provides: ✦ A brief report of imminent danger. ✦ A cancellation of all or part of a warning. ✦ An extended watch for 1–2 hours.
Advisories/Warnings			
Severe Thunderstorm Warning	___SVR___	Local NWS Office	Warning for severe thunderstorm(s) includes the: ✦ Hazards. ✦ Affected area. ✦ Expiration time. ✦ Basis of warning. ✦ Threat to confirmation. ✦ Location and movement. ✦ Call-to-action statements. NOTE: Warnings for severe thunderstorms, flash floods, and tornadoes may be combined and issued under one header based on the most severe threat.
Special Marine Warnings	___SMW___	Local NWS Office	Issued for severe thunderstorms over large bodies of water and include the same types of information as do severe thunderstorm warnings.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Discussions SPS Mesoscale Discussion	MKCSWOMCD	SPC	This is a daily unscheduled product used to communicate the current judgment of SPC forecasters to the user community.
Short Term Forecasts	___NOW___	Local NWS Offices	The NOW is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. It gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings, and advisories in effect at the time.

TORNADOES

DEFINITION

Tornadoes are the most violent storms on Earth, with estimated wind speeds of 250 m.p.h. or more. A tornado is a violently rotating column of air that extends from the base of a thunderstorm and comes in contact with the ground. The spinning motion of a tornado is almost always counterclockwise.

Thunderstorms develop in warm, moist air in advance of eastward-moving cold fronts. These thunderstorms often produce large hail, strong winds, and tornadoes. Tornadoes in the winter and early spring are often associated with strong, frontal systems that form in the Central States and move east. Occasionally, large outbreaks of tornadoes occur with this type of weather pattern. Several States may be affected by numerous severe thunderstorms and tornadoes.

During the spring in the Central Plains, thunderstorms frequently develop along a "dryline," which separates very warm, moist air to the east from hot, dry air to the west. Tornado-producing thunderstorms may form as the dryline moves east during the afternoon hours.

Along the front range of the Rocky Mountains, in the Texas panhandle, and in the southern High Plains, thunderstorms frequently form as air near the ground flows "upslope" toward higher terrain. If other favorable conditions exist, these thunderstorms can produce tornadoes.

Tornadoes occasionally accompany tropical storms and hurricanes that move over land. Tornadoes are most common to the right and ahead of the path of the storm center as it comes onshore.

A **funnel cloud** is a similar column of air that is not in contact with the ground. A **water spout** is a tornado that is over water. When either a funnel cloud or a water spout come in contact with the ground, they become, by definition, a tornado.

The visible column is composed of water droplets formed by condensation in the funnel. The fast-moving winds (either flowing into the tornado or in the main tornadic circulation) cause most of the damage. The vortex (or multiple vortexes) sucks in air from near the ground, along with dirt and debris. The dirt and debris block light, giving the tornado a dark color.

Tornadoes are defined in terms of the Fujita Scale, which ranks tornadoes on the basis of wind speed and damage potential. The Fujita Scale is shown in the following table.

DEFINITION

CATEGORY	*WIND SPEED*	*EFFECTS*
F0	40-72 m.p.h.	**Light damage:** Some damage to chimneys; branches break from trees; shallow rooted trees pushed over; sign boards damaged.
F1	73-112 m.p.h.	**Moderate damage:** Roof surfaces peeled off; mobile homes pushed from foundations or overturned; cars pushed off roads.
F2	113-157 m.p.h.	**Considerable damage:** Roofs torn off frame houses; mobile homes demolished; large trees snapped or uprooted.
F3	158-206 m.p.h.	**Severe damage:** Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	207-260 m.p.h.	**Devastating damage:** Well-constructed houses leveled; structures with weak foundations blown off some distance.
F5	261-318 m.p.h.	**Incredible damage:** Strong frame houses lifted off foundations and carried considerable distance to disintegrate.

- ✦ F0 and F1 tornadoes comprise 70 percent of all tornadoes that occur in the U.S. They usually touch down briefly and cause minor damage. However, forecasting these tornadoes is less reliable than for stronger tornadoes, so less than 50 percent occur during tornado watches.
- ✦ F2 and F3 tornadoes comprise about 28 percent of the tornadoes in the U.S. They can cause significant damage and cause injuries and deaths.
- ✦ F4 and F5 tornadoes comprise about two percent of the tornadoes in the U.S. and cause 70 percent of the death and destruction. Fortunately, the NWS has identified precursor conditions for the more damaging tornadoes. Over 95 percent of these tornadoes, therefore, occur during tornado watches.

CHARACTERISTICS

- ✦ **Wind.** Tornadoes consist of strong, often destructive winds. The winds in the strongest tornadoes are the fastest winds experienced anywhere on Earth, with rotation velocities up to 300 m.p.h.
- ✦ **Rain/hail.** Tornadoes are associated with thunderstorms, so they may be preceded or followed by heavy rainfall or hail. Depending on the hydrological conditions, flash flooding may occur.
- ✦ **Total destruction of homes,** especially mobile homes, businesses, and cars, causing many deaths.
- ✦ **Extensive tree damage** along roadways, which may inhibit or block access.
- ✦ **Extensive damage** to electric and telephone lines.
- ✦ **Utility line breaks.**
- ✦ **Damaged or destroyed radio and television towers.**

CHARACTERISTICS

Tornadoes develop as an outgrowth of thunderstorms. Large, strong, and long-lasting tornadoes are spawned by supercells. Once a thunderstorm has formed, given the right ingredients, a tornado can develop.

- ✦ A thunderstorm needs rising air for a tornado to form.
- ✦ The rising air begins to rotate because of strongly changing (veering) winds in the lower part of the atmosphere.

Each year, approximately 800 tornadoes touch down in the United States—the highest frequency in the world. Tornadoes occur most often when the lower layer of air is warm, which varies according to the time of year:

- ✦ Midwestern U.S.: April, May, and June.
- ✦ Southwest and North Central U.S.: May, June, July, August, and September.
- ✦ Southeastern U.S.: March, April, May, and June.
- ✦ Western U.S.: April, May, June, July, and August.

HISTORICAL EXAMPLES

- ✦ An outbreak of tornadoes hit the Midwest on April 26-27, 1991. Fifty-four tornadoes caused 21 deaths, 308 injuries, and over $277 million in damages. Fifteen deaths occurred in or near mobile homes, and two occurred in vehicles.
- ✦ An outbreak of 41 tornadoes hit the area of Lake Erie and Lake Ontario on May 31, 1985, causing 75 deaths in the U.S. There were 1,025 injuries, and these tornadoes caused $450 million in damages.
- ✦ On March 28, 1984, 22 tornadoes hit North and South Carolina in the afternoon and evening. They caused 57 deaths, over 1,000 injuries, and $200 million in damages. Thirty-seven percent of the fatalities were in mobile homes.
- ✦ In April 1974, treacherous thunderstorms developed in the Midwest, causing 127 tornadoes, the largest, most damaging tornado outbreak in U.S. history. Over 300 people were killed, 6,142 were injured, and damages were estimated at $600 million.

PRODUCTS

The table below and on the next pages lists products that can provide planning and preparedness information on tornadoes. Refer to the fact sheet on thunderstorms for more products.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks			
Convective Outlook Day 2	MKCSWODY2	Storm Prediction Center (SPC)	Forecast for severe thunderstorms, including tornadoes, for the contiguous 48 States for the next day (DY2) and that day (DY1). Includes areas, degree of risk or probability, hazards, and severity.
Convective Outlook Day 1	MKCSWODY1	SPC	
Public Weather Outlook	MKCPWOMKC	SPC	Discussion of an especially significant and/or widespread outbreak of severe thunderstorms.
Severe Weather Outlook	___SPS___	Local NWS Office	This is a local outlook for the potential of severe weather. It includes hazards, locations, severity, and timeframes.
Watches			
Tornado Watch	MKCSEL (1-9)*	SPC	A watch contains: ✦ Type of severe weather watch. ✦ Watch area. ✦ Valid period. ✦ Type of severe weather possible. ✦ Intensity of severe weather. ✦ Watch axis. ✦ Meaning of watch. ✦ Call-to-action statement. ✦ Discussion of meteorological reasoning. ✦ Other watch information.
Watch Cancellation	MKCSEL (1-9)*	SPC	This product cancels a tornado watch.

*1-9 indicates the consecutive number of issuance for the day.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Statements			
Tornado Watch Redefining Statement	___SLS___	Local NWS Office	Provides geographical or areal redefinition of a specific severe thunderstorm watch area including States, counties, and cities at risk.
Special Weather Statement	___SPS___	Local NWS Office	Provides for clearance of counties from local severe thunderstorm watches.
Severe Weather Statement	___SVS___	Local NWS Office	Provides: ✦ A brief report of imminent danger. ✦ A cancellation of all or part of a warning. ✦ An extended watch for 1–2 hours.
Warnings/ Advisories			
Tornado Warning	___TOR___	Local NWS Office	A tornado warning includes: ✦ Hazards. ✦ An affected area. ✦ Expiration time. ✦ A basis of warning. ✦ A threat confirmation. ✦ The location and movement. ✦ A call-to-action statement. NOTE: Warnings for tornadoes, severe thunderstorms, and flash floods may be combined and issued under one header based on the most severe threat.
Special Marine Warnings	___SMW___	Local NWS Office	Issued for water spouts and include the same types of information as do tornado warnings.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Discussions SPS Mesoscale Discussion	MKCSWOMCD	SPC	This is a daily, unscheduled product used to communicate the current judgment of SPC forecasters about the potential of severe weather to the user community.
Short Term Forecasts	___NOW___	Local NWS Offices	This is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. It gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings, and advisories in effect at the time.

FLASH FLOODS

DEFINITION

A flash flood occurs suddenly, within a short time (from minutes to less than 6 hours) after a causative event. Flash floods are the number one weather-related killer in the United States. Nearly half of all flash-flood fatalities are auto related.

Causative events include heavy rains from slow-moving thunderstorms, dam or levee failure, or the sudden release of water from the breakup of an ice jam. Intense short-duration rainfall on impervious areas, such as roads or nonabsorbing certain soils, also causes flash floods.

Flash floods are most prevalent on small streams, generally draining areas ranging in size from a few square miles to several hundred square miles. The most dangerous flash floods are usually associated with steep mountain streams, canyons, and desert washes where they can manifest themselves as a wall of water traveling downstream.

CHARACTERISTICS

Rainfall intensity and duration affect the potential for flash floods. Other non-meteorological factors that could affect an area's ability to absorb water include the topography, soil conditions, and ground cover.

Topography is important, especially where there are steep slopes. Gravity rapidly moves the water to the lowest point(s), reducing the time the runoff is susceptible to being absorbed by the ground, as well as funneling water from larger areas into the lowest region.

Some soils can absorb runoff more effectively (i.e., sand is better than clay) and reduce runoff. Soils covered with vegetation tend to retard runoff and mitigate rapid accumulation of water at low points. Wet soils have limited capability to absorb runoff, so rainfall is more effective in causing flooding when soils are moist. Frozen soils also do not allow for absorption of runoff. Finally, some soils, such as clay, that have been "baked" by long periods of hot, dry conditions, often have little capability to absorb runoff.

The most severe flash floods can roll boulders, tear out trees, destroy buildings and bridges, and scour out new channels. However, less serious flash flooding is still capable of taking lives. As little as a foot of moving water is enough to sweep a car into deeper flood waters. Also, children playing in flood waters, especially near culverts and drainage pipes, can be swept away. Other hazards associated with flash floods include:

- **Sudden release of huge walls of water**. Floating debris or ice can collect at an obstruction and restrict the flow of water. Pressure builds up behind the jam, and when the pressure bursts through, a huge wall of water of up to 30 feet is released, causing tremendous destruction.
- **Debris flows**. Debris caught in the water flow acts as battering rams, causing additional destruction.
- **Mud slides**. Flash floods can also trigger mud slides in areas with clay soils, saturated soils, or little ground cover.

HISTORICAL EXAMPLES

- In May 1889, a dam break in Johnstown, Pennsylvania, caused the worst flood in U.S. history. A 36- to 40-foot wall of water left over 2,200 dead.
- In June 1990, four inches of rain fell in less than 2 hours at Shadyside, Ohio, producing a 30-foot high wall of water. It caused 26 deaths and $6 to $8 million in damages.
- In Cheyenne, Wyoming, six inches of rain fell in 3 hours in August 1985. The flood left 12 dead and caused $61 million in damages.
- In July 1976, the headwaters of Big Thompson Canyon in Colorado received 10 to 12 inches of rain, most of it in 2 hours. The rain produced a 19-foot wall of water and debris, which caused about $35.5 million in damages. Victims had little warning, and 139 people were killed.
- In July 1972, Rapid City, South Dakota had 15 inches of rain in a 5-hour time period. The resulting flood caused 238 deaths and $164 million in damages.

PRODUCTS

The table on the following pages lists NWS products that can provide planning and preparedness information on flash floods. Refer to the fact sheet on riverine floods for other products.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks			
Flood Potential Outlook	___ESF___	Local NWS Office	This product is issued when conditions indicate that significantly heavy precipitation will cause or aggravate flash flooding. It is issued with a 36-hour or greater lead time. It includes the: ✦ Area affected. ✦ Timeframes. ✦ Discussion of hydrologic and meteorological factors and conditions. ✦ Information on projected watches and warnings.
Watches			
Flash Flood Watch	___FFA___	Local NWS Office	A Flash Flood Watch is used to inform cooperating agencies and the public about the threat of flash flooding. It covers precipitation, snow/ice melt, and dam break conditions. It includes the: ✦ Area affected. ✦ Timeframes. ✦ Conditions. ✦ Extent of hazardous conditions possible. ✦ Potential severity. ✦ Call-to-action statements.
Statements			
Flash Flood Statement	___FFS___	Local NWS Office	This product is issued to provide updates to flash flood watches and warnings. It can provide the: ✦ Latest information on flooding. ✦ Reduction in the area covered by a watch or warning. ✦ Termination of a watch or warning.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings			
Urban and Small Stream Flood Advisory	___FFS___	Local NWS Office	This product is designed to provide advance notice for flash flooding on small streams and in urban areas such as roads, underpasses and low-lying areas. This product is used for situations that are primarily a major inconvenience, *not* a life-threatening flood. It includes the: ✦ Area affected. ✦ Timeframes. ✦ Location and movement of flood producing storms. ✦ Call-to-action statement.
Flash Flood Warning	___FFW___	Local NWS Office	This warning indicates flash flooding is imminent or in progress. The warning should include the: ✦ Timeframes. ✦ Areas impacted. ✦ Severity of the flood. ✦ Movement of the flood. ✦ Call-to-action statement. ✦ Time of next issuance.
Discussions			
Hydromete-orological Discussion	__HMD__	River Forecast Centers (RFCs)	This product summarizes the current hydrometeorological situation, general trends of the RFC's hydrologic forecasts, and flood potential for the entire RFC area. The types of conditions monitored include: ✦ Areas where data indicate significant potential for runoff-causing rainfall. ✦ Rivers that are already above flood stage. ✦ Areas where soil moisture is above normal due to recent excessive rainfall. ✦ Areas covered by a significant, ripe snowpack that could readily melt in changing meteorological conditions such as a rain-on-snow event or a heat wave.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Discussions (Continued) Hydromete-orological Discussion (Continued)	__HMD__	River Forecast Centers (RFCs)	✦ Areas where frozen ground could generate dangerous runoff with moderate rainfall. ✦ Areas where ice jam breakups could potentially produce backwater flooding or dam-break-like flood conditions.
Short Term Forecasts N/A			

RIVERINE FLOODS

DEFINITION

Whereas flash floods occur quickly after an upstream event, riverine flooding is a longer term event that may last a week or more.

Flooding along rivers and streams is natural and inevitable. Some floods occur seasonally when winter or spring rains, coupled with melting snows, fill river basins with too much water too quickly. Torrential rains from hurricanes or tropical systems also can produce river and stream flooding.

Riverine flooding occurs when a stream flows over its banks and causes considerable inundation of nearby land and roads. On a leveed stream, these flows may be contained within the levees. However, uncontrolled flooding would occur if the stream level rises above the levee or if the levee fails. The ability of the levee to withstand flooding depends on the design standards used when constructing the levee, as well as on operation, planning and maintenance. Many private (mostly agricultural) levees are not built to withstand major floods.

CHARACTERISTICS

Riverine flooding is normally the result of a combination of meteorological and hydrological factors. Although excessive rainfall alone can cause flooding, the most severe riverine floods usually have multiple causative factors. These factors may include:

- ✦ Heavy, prolonged rainfall from large-scale storms or a series of large-scale storms.
- ✦ Heavy rainfall from a near-stationary or slow-moving thunderstorm complex.
- ✦ Saturated soil conditions from previous rainfall events.
- ✦ High existing river flows from previous rainfall events.
- ✦ Extreme cold temperatures followed by thawing, leading to river ice jams.

The dangers of riverine floods are similar to coastal and flash floods. Dangers include:

- ✦ Damaged or destroyed buildings and vehicles.
- ✦ Uprooted trees causing power and utility outages.
- ✦ Drowning, especially people trapped in cars.
- ✦ Contamination of drinking water.
- ✦ Dispersion of hazardous materials.
- ✦ Interruption of communications and/or transportation systems.
- ✦ Rapid snowmelt. Snowmelt floods can develop over periods ranging from several hours to several days, depending upon the part of the country, the water content of the snow, and temperatures during the melting period. The combination of large-scale storm rainfall and rapidly melting snow can cause severe flooding.
- ✦ Silt buildup in river channels during previous storm events that reduces the capacity of the river to carry water.

HISTORICAL EXAMPLES

- The Great Flood of 1993 in the Mississippi Valley affected nine States, resulted in 31 deaths, and caused $15 to 20 billion in damage. Months of above-average rainfall, heavy spring rains, saturated soils, continued summer rains, failed levees, and riverbed erosion contributed to the major flooding on the Missouri and Mississippi Rivers and numerous tributaries. Numerous drinking water systems were contaminated; river shipping was closed for 2 months; and crops, homes, businesses, roads, and bridges were destroyed.
- The South-Central Texas River Flood in December 1991 and January 1992 caused widespread flooding in the Guadalupe, Brazos, Trinity, and Colorado River basins. Seventeen inches of rain fell, causing 15 deaths and $100 million in damage.
- In 1979, Tropical Storm Claudette brought 45 inches of rain to an area near Alvin, Texas, contributing to more than $600 million in damage.
- In 1972, Hurricane Agnes fused with another storm system, producing floods in the Northeast that contributed to 122 deaths and $6.4 billion in damage.
- In 1955, long after the winds of Hurricane Diane subsided, the storm brought floods to Pennsylvania, New York, and New England that contributed to nearly 200 deaths and $4.2 billion in damage.

PRODUCTS

The following table lists NWS products that can provide planning and preparedness information on riverine floods.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks			
Flood Potential Outlook	___ESF___	Local NWS Office	This product is issued when conditions indicate that significantly heavy precipitation will cause or aggravate flooding. It is issued with a 36-hour or greater lead time. It includes the: ✦ Area affected. ✦ Timeframes. ✦ Discussion of hydrologic and meteorological factors and conditions. ✦ Information on projected watches and warnings.
Excessive Rain Outlook	NMCGPH94E	NCEP	
Watches			
Flood Watch	___FFA___	Local NWS Office	This is used to inform cooperating agencies and the public about the threat of flooding. It covers precipitation, snow/ice melt, and dam break conditions. It includes the: ✦ Area affected. ✦ Timeframes. ✦ Conditions. ✦ Extent of hazardous conditions possible. ✦ Potential severity. ✦ Call-to-action statement.
Statements			
Flood Statement	___FFS___	Local NWS Office	This product is issued to provide updates to flood watches and warnings. It can provide the: ✦ Latest information on flooding. ✦ Reduction in the area covered by a watch or warning. ✦ Termination of a watch or warning.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
STATEMENTS (Continued)			
Flood Statement	___FLS___	Local NWS Office	This product is issued to update and expand the information in a Flood Warning (FLW, see below). The Flood Statement may be used in lieu of a warning if flooding is forecast, imminent, or existing and presents no threat to life or property. The statement is used also to terminate a Flood Warning.
River Statement	___RVS___	Local NWS Office	This product provides daily river stage forecasts and information about ice jams and ice movement that does not warrant a Flood Warning or a Flood Statement. It is used also to communicate conditions such as low flows, chemical spills, etc.
River Ice Statement	___RVI___	Local NWS Office	This product can contain numeric and/or narrative information on river ice conditions.
Advisories/ Warnings			
Flood Warning	___FLW___	Local NWS Office	This product normally specifies crest information and is issued for specific communities or areas along rivers where flooding has been forecast, is imminent, or is in progress.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Discussions Hydromete-orological Discussion	___HMD___	River Forecast Centers (RFCs)	This product summarizes the current hydrometeorological situation, general trends of the RFC's hydrologic forecasts, and flood potential for the entire RFC area. The types of conditions monitored include: ✦ Areas where QPFs indicate significant potential for runoff-causing rainfall. ✦ Rivers that are already above flood stage. ✦ Areas where soil moisture is above normal due to recent excessive rainfall. ✦ Areas covered by a significant, ripe snowpack that could readily melt in changing meteorological conditions such as a rain-on-snow event or a heat wave. ✦ Areas where frozen ground could generate dangerous runoff with moderate rainfall. ✦ Areas where ice jam breakups could potentially produce backwater flooding or dam-break-like flood conditions.
Short Term Forecasts N/A			

COASTAL FLOODS

DEFINITION

Coastal flooding is the inundation of land areas along the oceanic coast that is caused by sea waters over and above normal tidal action. Such flooding can originate from the ocean front, back bays, sound, etc. Coastal flooding affects the general public and maritime interests along much of the U.S. coastline extending from the shoreline beaches to inland tidal waterways and the tidal portions of river mouths.

Coastal flooding basically results from one or a combination of the following:

- A storm surge and/or seiche reaching land.
- Heavy surf.
- Tidal piling.

Other factors affecting the local severity, extent, and duration of coastal flooding include:

- Tidal cycles.
- Persistence and behavior of the storm that is generating the flooding.
- Topography, shoreline orientation, and bathymetry of the area.
- River stage or stream run-off.
- Presence or absence of offshore reefs or other barriers.
- High winds that exacerbate damage from the water.

Lakeshore flooding affects the general public as well as marine interests in some areas of the Great Lakes. These areas extend from beaches to portions of rivers flowing into the lakes to larger lake plains. The causes of flooding are variable, and the extent of the flooding will be highly dependent on surrounding shore terrain. The underlying causes of lakeshore flooding are:

- **Seiches** in the Great Lakes can be generated either by strong winds blowing along the axis of a lake or by a pressure jump and down draft winds associated with fast moving squall lines over a lake. In either case, water is piled up at one end of the lake. When the forcing mechanism ends, the water sloshes from one end of the lake to the other, causing water fluctuations of perhaps several feet before damping out.
- **Storm surges** on the Great Lakes are characterized by a rise above normal water level along a shore because of the action of wind stress and atmospheric pressure reduction over the open water. Locally generated waves accentuate the storm surge as they are superimposed on the water level as it rises. Surge height is the difference between the observed water level and the level that would have occurred in the absence of the storm (often called the **still water level**).

A **storm surge** is a dome or bulge of water that is caused by wind and pressure forces. It is a rise above the normal water level along a shore that is caused by strong onshore winds and/or reduced atmospheric pressure. The surge height is the difference of the observed water level minus the predicted tide.

A **seiche** is caused by winds that push lake water to one end of the lake. When the storm ends or moves on, the water sloshes to the other end of the lake, causing water level changes of up to several feet.

DEFINITION

The **surf** is the waves in the area between the shoreline and the outermost limit of breakers.

The **Tidal Cycle** is the periodic change in the intensity of tides that is caused primarily by the varying relations among the earth, moon, and sun.

Mean Sea Level (MSL) is the average height of the surface of the sea at a particular location for all stages of the tide over a 19-year period.

The **Datum Plane (tidal datum)** is the horizontal plane, unique to each individual tidal station, to which soundings, ground elevations, or water surface elevations for that station are referred. The plane is called a **tidal datum** when it is defined by a certain phase of the tide.

CHARACTERISTICS

A storm surge is caused by powerful coastal storms that move toward or adjacent to the coastline. It may be worsened by higher than normal astronomical tide levels. Two factors are key in the development of a storm surge:

- ✦ **Low barometric pressure** reduces the weight of the air on the ocean surface causing a slight rising (1 to 2 feet) of the surface of the water. This rising creates a dome and a new balance of forces.
- ✦ **Wind** sweeps around the dome of water and induces currents that spiral toward the center of the storm. The force of the winds induces high waves that travel away from the storm. Wind is the dominant force at landfall, often bringing violent wave action far inland. The battering of these waves causes damage beyond mere flooding.

The weight of the water piling up creates pressure on water at lower depths. In deep water, the water under pressure can escape rather easily, reducing the height of the dome. Closer to the coasts, however, there is less opportunity for water at lower depths to escape, and the water is forced to rise, elevating the height of the dome. As a result, islands and coastal areas with a short continental shelf that drops off quickly (e.g., Ft. Lauderdale, Florida) have fewer problems with storm surges than areas along the coast that have a wide continental shelf, bays, and "angle" topography (e.g., Florida's Panhandle or the Texas coast).

As storm surge comes ashore, it may combine with the tide. Thus, a 10-foot storm surge, combined with a 2-foot high tide produces a water level or storm tide that is 12 feet tidal datam. The surge does not usually arrive as a wall of water but rather as a rapid rise in the tide to abnormally high levels.

Storm surge, together with heavy rains from the storm that produced the surge, will cause extensive coastal and inland flooding. Other hazards associated with coastal floods include:

- ✦ High winds.
- ✦ Quickly rising water levels.
- ✦ Fierce wave action.
- ✦ Shore erosion and seawall destruction.
- ✦ Debris from destroyed property carried by the water.

HISTORICAL EXAMPLES

- A nor'easter backed up water and caused coastal flooding on the north side of St. Augustine, FL, when more than five and one-half inches of rain fell during 24 hours on June 5, 1995. This storm caused more than $300,000 worth of damage, and with numerous roads and streets closed, 15 of 23 schools canceled classes.
- In March 1963, a storm surge developed south of a deepening low, causing damage totaling $3 million in Barrow, AK. Buildings and vehicles were damaged, the fresh water supply was contaminated with sea water, and the electrical generating plant received major damage.
- On December 10, 1993, a strong storm hit the Pacific Northwest, causing the spit of beach south of the Grays Harbor Entrance to be breached by the waves. The channel that developed between the ocean and Half Moon Bay kept getting wider and deeper and subjected the city of Westport to frequent wave action, thus eroding the sand dunes protecting the city's wastewater treatment plant. Millions of cubic yards of sand had to be pumped in to fill the breach.

PRODUCTS

The table list below and on the next pages lists NWS products that provide planning and preparedness information on coastal flooding and lakeshore flooding. Refer to thunderstorms, tropical cyclones, and tsunamis fact sheets for other products.

COASTAL FLOODING

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks N/A			
Watches Coastal Flood Watch	___CFA___	Local Weather Service Office	This watch is used to inform the public that coastal flooding is possible approximately 12 to 36 hours after issuance time. Watches include the: ✦ Time of next update. ✦ Geographical area covered. ✦ Valid time of watch. ✦ Brief description of event including the severity of flooding, inland extent, associated weather, and the effects of tides. A watch may include: ✦ A Heavy Surf Advisory. ✦ A definition of watch (time permitting). ✦ An appropriate call to action (time permitting). A Coastal Flood Watch is either replaced by another Coastal Flood Watch, upgraded to a Coastal Flood Warning, updated by a Coastal Flood Statement (every six hours), or canceled by a Coastal Flood Statement.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Statements			
Coastal Flood Statement	___CFS___	Local Weather Service Office	This product is issued to keep the public informed of the status of existing coastal flood watches and/or warnings. (It is issued at least every six hours after the issuance of a watch or warning until the watch or warning is canceled.) The Coastal Flood Statement is used to cancel a watch or warning or to clear part of a watch or warning area that is no longer threatened by coastal flooding. It also provides the latest information on local conditions, an overview of the threat for the entire coastline, and current tidal information. A Coastal Flood Statement includes the same information as the watch or warning that the statement updates **and** the status of the watch/warning. ✦ If clearing an area from the watch or warning, the statement will describe the area being removed and the reasons for the removal. ✦ If canceling the entire watch/warning, it states the cancellation and the reason for the cancellation. ✦ If the watch/warning is being absorbed into another product, the statement explains the changes and refers the user to the new information source.
Marine Weather Statement	___MWS___	Local Weather Service Office	This statement is issued for less severe episodes or when conditions are uncertain. The MWS also may be used to issue a Heavy Surf Advisory. The MWS is updated at least every six hours until canceled.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings			
Coastal Flood Warning	___CFW____	Local Weather Service Office	This product is used to inform the public that coastal flooding, posing a serious threat to life and property, is occurring, is imminent, or is expected within approximately the next 12 hours. A warning includes the: ✦ Time of next update. ✦ Geographical area covered. ✦ Valid time of warning. ✦ Brief description of event including severity of flooding, inland extent, associated weather, and effects of tides. A warning may include: ✦ A Heavy Surf Advisory. ✦ A definition of the warning (time permitting). ✦ An appropriate call to action (time permitting). A Coastal Flood Warning is either replaced by another Coastal Flood Warning, updated by a Coastal Flood Statement (every six hours), or canceled by a Coastal Flood Statement.
Heavy Surf Advisory		Coastal Local Weather Service Office	This is a forecast of heavy (high) surf that may pose a threat to life or property. These advisories may be issued alone within a Marine Weather Statement or in conjunction with Coastal Flood Watches or Warnings.
Discussions N/A			

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Short Term Forecasts	___NOW___	Coastal Local Weather Forecast Office	These forecasts are designed to provide the public with a plain language description of current and short term weather and flooding conditions for the issuing office's county warning area. The coastal flood information contained in the forecasts supplements—does not replace—the Coastal Flood Statement.

LAKESHORE FLOODING

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks N/A			
Watches N/A			
Statements Lakeshore Statement	___LSH___	Open Lake Responsible Local Weather Service Office	This product is issued as a followup to warnings and to alert the public of potentially hazardous conditions. It also is issued to provide advance notice of a developing situation that may require later issuance of a Lakeshore Warning and to cancel a warning when conditions improve. Statements include: ✦ The latest information available on local conditions. ✦ An overview on the threat to the shoreline community. A statement is issued at least every 6 hours after a warning is issued (more frequently if conditions are changing rapidly).

PRODUCTS

LAKESHORE FLOODING

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings Lakeshore Warning	___LSH___	Open Lake Responsible Local Weather Service Office	This is issued for lakeshore flooding that is occurring or imminent within approximately the next 12 hours and that poses a serious threat to life or property. In unusual circumstances that require longer advance notice for public response, the warning lead time may be extended to 24 hours. The Lakeshore Warning provides the following information on the extent, location, and duration of the event: ✦ Geographical area. ✦ Effective time of the warning in hours or in general terms (e.g. this afternoon, this evening). ✦ Definition of warning. ✦ Severity of the flooding (including water levels, if available). ✦ Call to action. If there are changes in the warning area, a new Lakeshore Warning will be issued.
Discussions N/A			
Short Term Forecasts N/A			

EXTRATROPICAL CYCLONES

DEFINITION

Most of the storms that affect U.S. weather are extratropical. These are deep, low-pressure storms that:

- ✦ Form outside the tropics off the Pacific coast, in the Gulf of Mexico, over the Atlantic Ocean, or in the Great Lakes.
- ✦ Cover a larger area (700–1000 miles across) than tropical cyclones.
- ✦ Have a storm center that is colder than the surrounding air.
- ✦ Have their strongest winds in the upper atmosphere.

CHARACTERISTICS

Under ideal wind and temperature conditions, a coastal low-pressure system deepens rapidly. Because these storms form over water, which has a smoother surface than land, wind speeds pick up rapidly. Fewer weather data tend to be available from the ocean areas, so detection may lag behind storm development. Extratropical cyclones tend to *deepen quickly near the shore*, which shortens the time available for communities to respond.

Hazards from extratropical cyclones include:

- ✦ Swells, storm surges, and huge waves that pound the coastline.
- ✦ Very high winds generated by strong gradients of pressure.
- ✦ Coastal flooding.
- ✦ Heavy rains, flooding, and flash flooding.
- ✦ Heavy snow.
- ✦ Mud slides.
- ✦ Downbursts.
- ✦ Tornadoes.

Refer to the fact sheets on coastal floods, winter storms, and tornadoes for more information on these hazards.

HISTORICAL EXAMPLES

- The extratropical coastal cyclone named the 1993 Superstorm formed in the Gulf of Mexico and affected 22 States. It produced deadly 12-foot storm surges that flooded the gulf coast of Florida; generated thunderstorms, gale-force winds gusting to over 80 m.p.h. and tornadoes; spread blizzard conditions over a massive area from the Southeast through New England; and then plummeted the eastern half of the U.S. into deep-freeze temperatures. Over 400 people died and damage estimates exceeded $2 billion.
- The October 1991 storm that formed in the Atlantic had devastating effects on the coastlines of New England. It damaged sea walls, closed roads, and produced flooding that caused massive damage and injuries over a large area from New Jersey northward.
- In February 1986, a series of coastal storms formed in the Pacific and struck California, producing gale-force winds and heavy flooding. Thirty-nine counties were declared disaster areas, and at least 15 people died because of drowning, mud slides, and collapsing buildings. Flooding washed out roads, bridges, dams, and railroad beds; destroyed homes and businesses; and caused massive power outages. Preliminary property loss estimates exceeded $350 million.

PRODUCTS

The National Weather Service does not issue any products unique to extratropical cyclones. Refer to fact sheets on winter storms, thunderstorms, coastal floods, or riverine floods, as necessary, for products related to extratropical cyclones.

TROPICAL CYCLONES

DEFINITION

Tropical cyclones are coastal storms that:

- ✦ Form over a tropical ocean.
- ✦ Cover a smaller area (200–500 miles across) than extratropical cyclones.
- ✦ Have a storm center warmer than the surrounding air.
- ✦ Have the strongest winds at about 10,000 feet.

Tropical cyclones are categorized by wind speed as shown in the table below.

CATEGORY	*WIND SPEED*
Tropical Depression	Maximum sustained winds near the surface less than 39 m.p.h.
Tropical Storm	Winds of 39–73 m.p.h.
Hurricane	Winds of 74 m.p.h. or more.

(NOTE: A hurricane is called a **typhoon** if formed in the western Pacific, and a **cyclone** if formed in the Indian Ocean.)

In the Northern Hemisphere, intense tropical cyclones are called hurricanes, a term that echoes colonial Spanish and Caribbean Indian words for evil spirits and big winds. The storms are products of the tropical ocean and atmosphere, powered by the easterly trades and temperate westerlies and their fierce energy. Around the core, winds blow with lethal velocity, and the ocean develops inundating surge. As they move ashore, tornadoes may descend from the advancing thunderclouds.

This fact sheet provides planning and preparedness information on hurricanes, as the other tropical cyclones present similar hazards, yet typically are not as severe.

CHARACTERISTICS

Hurricanes are generated by the rising and cooling of humid air over the ocean. They need the following ingredients to develop:

- Ocean water over 80^0F and about 200 feet deep.
- Winds converging near the water surface.
- Unstable air, so that the warm air continues to rise.
- Humidity up to about 18,000 feet to supply heat energy.
- Winds moving in one direction to move the storm along without breaking it up.
- Upper atmosphere high pressure to help move out the rising air of the storm.

Hurricane winds blow counterclockwise around the center, or eye, of the storm, and air currents carry the storm along. Most Northern Hemisphere hurricanes move from east to west in the trade winds. They may turn north or northwest out in the Atlantic, then curve toward the northeast. Storms that move up the east coast usually pick up speed around North Carolina and may travel at speeds up to 70 m.p.h.

Hurricanes are classified using the following Saffir-Simpson Hurricane Damage Potential Scale, based on central barometric pressure and wind speed. The Saffir-Simpson Scale is shown in the table below.

CATEGORY	*CENTRAL PRESSURE (MILLIBARS)*	*CENTRAL PRESSURE (INCHES)*	*WINDS (MPH)*	*WINDS (KTS)*	*DAMAGE*
1	980	28.94	74–95	64–83	Minimal
2	965–979	28.50–28.93	96–110	84–96	Moderate
3	645–964	27.91–28.49	111–130	97–113	Extensive
4	920–944	27.17–27.90	131–155	114–135	Extreme
5	< 920	< 27.17	> 155	> 135	Catastrophic

Hydrometeorological hazards associated with hurricanes include:

- **Coastal flooding** caused by a storm surge.
- **Windstorms** due to extremely strong winds.
- **Riverine flooding** caused by heavy rains.
- **Tornadoes.**

These hazards are described on the next page. Refer to the fact sheet for each hazard for more information.

CHARACTERISTICS

Historically, the worst damage from hurricanes comes from coastal flooding caused by storm surge. A storm surge is an abnormal rise in water level caused by wind and low-pressure forces. The lower the pressure of the storm, the greater the height of the storm surge. High winds and low pressure can build a wall of water out in the ocean about 10 feet high. The highest surges in the United States have reached 20 feet. When the surge reaches land, the wall of water can cause extensive coastal flooding.

Hurricane-force winds also can cause extensive damage and death. The strongest winds in a hurricane occur from 10 to 30 miles from the center of the eye, in a region called the **eye wall**. Winds that extend outward from the eye wall in the front right quadrant are the most devastating. Precursor winds will affect land well before the most damaging winds of the eye.

When a hurricane reaches land, it begins to weaken as it loses its warm-water energy source and encounters greater surface friction over land. This weakening process is gradual, so even though wind speeds may be reduced by 50 percent within 12 hours, hurricane-force winds can penetrate far inland in that timeframe. Additionally, tropical storm-force winds can extend far beyond the storm center and, although weaker, can cause significant damage.

Coastal and inland jurisdictions affected by hurricane winds should anticipate:

- ✦ Widespread damage to homes, especially mobile homes, and businesses.
- ✦ Extensive tree damage along roadways, which may inhibit or block access.
- ✦ Extensive damage to electric and telephone lines.
- ✦ Damaged and/or destroyed signs and traffic-control devices.
- ✦ The potential for utility line breaks, if large trees are uprooted.
- ✦ Damaged radio and television towers.

Widespread torrential rains of six to 12 inches are not uncommon in hurricanes and can produce deadly and destructive floods. Riverine flooding is a major threat to areas well inland.

Hurricanes may also spawn tornadoes, which add to the hurricane's destructive power. These tornadoes most often occur in the thunderstorms embedded in rain bands out from the right front quadrant of the hurricane, although they can also occur near the eye wall.

HISTORICAL EXAMPLES

- Hurricane Andrew, in 1992, caused an estimated $25 billion in damage, making it the most expensive hurricane in U.S. history. Wind gusts were estimated to be at least 175 m.p.h. in south Florida.
- Hurricane Agnes, in 1972, fused with another storm system, producing floods in the Northeastern U.S. that contributed to 122 deaths and $6.4 billion in damage.
- Long after the winds of Hurricane Diane in 1955 subsided, the storm brought floods to Pennsylvania, New York, and New England that contributed to nearly 200 deaths and $4.2 billion in damage.

PRODUCTS

A valuable source of information is your community's Hurricane Evacuation Study, if one has been completed. Contact the local WSFO to check if a study has been completed for your area and to obtain a copy.

The table below and on the next pages lists NWS products that can provide planning and preparedness information on tropical cyclones.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Tropical Weather Outlooks	___TWO___ MIATWOAT (1-5)* MIATWOEP (1-5)* HNLTWOCP (1-5)* SJUTWOSJU	National Hurricane Center Central Pacific Hurricane Center San Juan, PR NWS Office	The Tropical Weather Outlook is prepared by the National Hurricane Center (NHC) and Central Pacific Hurricane Center (CPHC). (Note: The last two letters in the identifiers indicate location—e.g., AT is Atlantic, EP is Eastern Pacific). It is issued by San Juan in a Spanish translation. It should include the system's location (in either general terms or map coordinates), status, and change in status.

*(1-5) indicates the consecutive number of issuances for the day.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Watches N/A			Hurricane Watches are contained in the Public Advisories.
Statements Hurricane Local Statements	___HLS___	Local NWS Office	These products are issued at regular and frequent intervals. When a tropical storm or hurricane is close to the coast, the products are issued at 2 or 3 hourly intervals and more frequently if information and circumstances warrant. These statements contain the following: ✦ A concise lead sentence or headline. ✦ A sentence detailing which counties, parishes, or cities are included. ✦ Watches and warnings in effect and counties or parishes to which they apply.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Public Advisories Tropical Depression Advisory Tropical Storm Advisory Hurricane/ Typhoon Advisory	 MIATCPAT (1-5) MIATCPEP (1-5) HNLTCPCP (1-5)	 National Hurricane Center	Scheduled and issued every six hours. The type of advisory depends upon the strength of the tropical cyclone. A tropical depression advisory will be issued for winds up to 33 knots (38 m.p.h.). A tropical storm advisory will be issued for winds 34 knots to 63 knots (39 to 73 m.p.h.). A hurricane/typhoon advisory is issued for wind 64 knots (74 m.p.h.) or greater. All advisories shall include the: ✦ Location of the center of the tropical cyclone. ✦ Present movement. ✦ 24-hour forecast movement. ✦ Uncertainties in either location or movement. ✦ Wind, central pressure, and storm surge to describe the storm. ✦ Expected time of onset of tropical storm or hurricane/typhoon force winds. ✦ Intensity forecasts. ✦ Inland effects of tropical cyclones to include threat of strong winds, and anticipated rainfall amounts, including the potential for flooding.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Public Advisories (Continued)			Because intermediate advisories are designed to update earlier scheduled advisories, their format and content may be less formal and less complete. The content of special advisories is generally similar to that of the scheduled advisory.
Tropical-Cyclone Forecast/ Advisory	MIATCPAT (1-5) MIATCPEP (1-5) HNLTCPCP (1-5)	National Hurricane Center Central Pacific Hurricane Center	This product is scheduled and issued every six hours. It provides invaluable wind field information to emergency managers, local decisionmakers, and other users who must make preparations and take response actions for the inland wind effects of tropical cyclones. Accordingly, inland interests should be appraised of the availability of this product and should be encouraged to use it in concert with the public advisories for decisionmaking purposes. Advisories contain 12-, 24-, 36-, 48-, and 72-hour forecast positions.
Warnings N/A			Hurricane Warnings are contained in the Public Advisories.
Strike Probability Forecast	___SPF___	National Hurricane Center	This product describes the probability of tropical cyclone conditions and is issued in tabular form at the regularly scheduled public advisory times and when special public advisories are issued. The probabilities, which are based on the official forecast track and are carried in advisories, are issued when the 72-hour position approaches the coast.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Strike Probability Forecast (Continued)			Probabilities are computed shortly after synoptic times for the periods 0-24, 24-36, 36-48, and 48-72 hours. A total probability for the 72 hours is shown in the last column representing a total of all forecast products. Probabilities are not issued for the west coast of the continental United States or Hawaii. If the probability for a location is less than one percent, an "X" will be indicated in the table. If probabilities are not issued, a statement indicating this exclusion will be contained in both the public advisory and tropical cyclone forecast/advisory.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Discussions			
Tropical Weather Discussion	____TCD___	National Hurricane Center and Central Pacific Hurricane Center	This product explains the forecaster's reasoning behind the analysis and forecast of tropical cyclone characteristics. These discussions normally include prognostic reasoning, objective techniques employed, and guidance used.
Preliminary Post-Storm Report	___PSH___	Local NWS Office	These reports provide details of the storm's impact, including accounts of unusual storm damage. Reports will include the: ✦ Highest recorded 1-minute sustained surface wind, peak gust, and date/time of occurrence. ✦ Lowest sea level pressure recorded, including date/time of occurrence. ✦ Storm total rainfall amount and duration, to include 1-, 6-, 12-, 24-hour amounts identifying date/time of occurrence. ✦ Maximum storm tide heights and storm surge heights in feet above normal. ✦ Extent of beach erosion if appropriate. ✦ Flooding/flash flooding within the area of responsibility. ✦ Tornadoes within the area of responsibility. ✦ Preliminary storm effects, such as deaths, injuries, dollar damage amounts, number of residents evacuated, etc.
Short Term Forecast	___NOW___	Local NWS Office	The NOW is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. It gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings, and advisories in effect at the time.

WINTER STORMS

DEFINITIONS

Winter storms are extratropical storms that bring cold temperatures, precipitation, and possibly, high winds.

The following conditions can occur during winter storms:

- **Snow** is defined as a steady fall of snow for several hours or more.
- **Heavy snow** generally means:
  - Snowfall accumulating to 4 inches or more in depth in 12 hours or less.
  - Snowfall accumulating to 6 inches or more in depth in 24 hours or less.
- **Snow squalls** are periods of moderate to heavy snowfall, intense, but of limited duration, accompanied by strong, gusty surface winds and possibly lightning.
- A **snow shower** is a short duration of moderate snowfall.
- **Snow flurries** are an intermittent light snowfall of short duration with no measurable accumulation.
- **Blowing snow** is wind-driven snow that reduces surface visibility. Blowing snow can be falling snow or snow that already has accumulated but is picked up and blown by strong winds.
- **Drifting snow** is an uneven distribution of snowfall/snow depth caused by strong surface winds. Drifting snow may occur during or after a snowfall.
- A **blizzard** means that the following conditions are expected to prevail for a period of 3 hours or longer:
  - Sustained wind or frequent gusts to 35 m.p.h. or greater.
  - Considerable falling and/or blowing snow reducing visibility to less than 1/4 mile.
- **Freezing rain or drizzle** occurs when rain or drizzle freezes on surfaces, such as the ground, trees, power lines, motor vehicles, streets, highways, etc.
- The term **ice storm** is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations.
- **Sleet** is pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes.
- A **freeze** occurs when the surface air temperature is expected to be 32°F or below over a widespread area for a climatologically significant period of time. Use of the term usually is restricted to advective situations or to occasions when wind or other conditions prevent frost.
- **Frost** describes the formation of thin ice crystals on the ground or other surfaces in the form of scales, needles, feathers, or fans. Frost develops under conditions similar to dew, except the temperatures of the Earth's surface and earthbound objects fall below 32°F. Because frost is primarily an event that occurs as the result of radiational cooling, it frequently occurs with a thermometer-level temperature in the mid-30s.
- **Wind chill** describes the cooling of a body by air motion. Increased wind speeds accelerate heat loss from exposed skin. As a general rule, the threshold for potentially dangerous wind chill conditions is about -20^{0}F.

CHARACTERISTICS

The development of a winter storm requires:

- **Cold air.** Subfreezing temperatures (below 32^0F, 0^0C) in the clouds and near the ground are needed to make snow and/or ice.
- **Moisture.** The air must contain moisture in order to form clouds and precipitation. Air blowing across a body of water, such as a large lake or an ocean, is an excellent source of moisture.
- **Lift.** A mechanism to raise the moist air to form the clouds and cause precipitation must be present. Lift may be provided by any or all of the following:
  - The flow of air up a mountainside.
  - Fronts, where warm air collides with cold air and rises over the cold dome.
  - Upper level low pressure troughs.

The hazards involved with winter storms include:

- **Strong winds.** Sometimes winter storms are accompanied by strong winds, creating wind-driven snow, severe drifting, and dangerous wind chill. Strong winds can knock down trees, utility poles, and power lines. Storms near the coast can cause coastal flooding and beach erosion. In the West and Alaska, winds descending off the mountains can gust to 100 m.p.h. or more, causing extensive damage.
- **Extreme cold.** Extreme cold may accompany or follow a winter storm. Freezing temperatures can cause bursting pipes, crop damage, river ice jams and subsequent flooding, and frostbite or hypothermia due to exposure. Refer to the fact sheet on extreme cold for more information.
- **Precipitation.** The type of precipitation accompanying a winter storm depends on surface and atmospheric conditions. Ice and snow accumulation can knock down trees and power lines, disrupting power and communication for days. Accumulated winter precipitation also causes hazardous traffic conditions and disrupts transportation routes, especially in warmer climates where accumulation is uncommon. This can leave travelers and rural residents stranded and stop the flow of supplies for a region.
- **Heavy snow and blizzard conditions.** During a blizzard, snow and strong winds combine to produce a blinding snow (near zero visibility), deep drifts, and life-threatening wind chill. Along with other hazards of accumulated ice and snow and extreme cold, the reduced visibility can lead to extreme transportation problems and increase fatalities due to exposure. Areas around the Great Lakes are affected by **lake-effect storms.** Lake-effect storms form as arctic air is drawn from the north and moves across the lakes, drawing moisture from the unfrozen water. These storms typically form snow squalls and deliver heavy snow to a localized area.

HISTORICAL EXAMPLES

- ✦ The 1993 Superstorm dumped massive amounts of snow from the Gulf Coast States northeastward through New England. Many cities experienced record low barometric pressure readings, indicative of a hurricane-force storm. In the South, many areas received record-breaking snowfalls (e.g., Birmingham, Alabama received 13 inches of snow). The volume of water that fell as snow may be unprecedented—estimated at 44 million acre-feet. At least 243 deaths were attributed to the storm, and 48 persons were lost at sea. For the first time, every major airport on the east coast was closed at one time or another by the storm. Over 3 million customers were without electricity. Wind gusts were recorded at 110 mph in Florida. Damages were estimated at $2 billion.
- ✦ An unexpected spring blizzard in May 1986 trapped 13 people on Mt. Hood, Oregon. Nine died, two walked to safety, and two were rescued after being buried under 4 feet of snow. One of the rescued survivors later had his lower legs amputated due to frostbite.

PRODUCTS

The table on the following pages lists NWS products that can provide planning and preparedness information on winter storms. Refer to the fact sheets on extratropical coastal cyclones and extreme cold for information on other products.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks			
Winter Storm Outlook	___SPS___	Local NWS Office	This product may be issued when there is a good chance of a major winter storm beyond the point normally covered by a watch (3-5 days). The prime objective of the outlook is to inform users of the potential of the upcoming event. The need for an outlook depends on: ✦ NCEP guidance. ✦ High confidence that a large-scale storm will occur. ✦ Need for advance public notice (e.g., national holiday or regionally significant event associated with widespread travel).
Watches			
Winter Storm Watch	___WSW___	Local NWS Office	This product is issued when conditions are favorable for hazardous winter weather conditions to develop over part or all of the forecast area, but the occurrence is still uncertain. It is intended to provide enough lead time so those who need to take action can do so. A Winter Storm Watch includes the: ✦ Affected area. ✦ Reason the watch was issued. ✦ Potential snowfall amounts and ice accumulations. ✦ Explanation of a watch and the uncertainty involved. ✦ Precautions, call-to-action statements, and potential impact. A Winter Storm Watch either evolves into a Winter Storm Warning or advisory or it is canceled. (See Special Weather Statement.)

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Statements			
Special Weather Statement	___SPS___	Local NWS Office	This statement is issued at frequent intervals: ✦ Before active weather develops to outline expected conditions, affected areas, timing, and appropriate response actions. ✦ When the event begins to keep users informed about the current aspects of the storm, to heighten awareness, and ensure a proper response. ✦ To cancel Winter Storm Watches, warnings, and advisories, including the reason for ending the advisory, warning or watch, and details about the history of the event (snow accumulations, height of snow drifts, amount of freezing rain, general road conditions, etc.).
Severe Weather Statements	___SVS___	Local NWS Office	This statement is used during blizzard situations for greater emphasis on the life-threatening nature of these dangerous storms. (It contains the same information as the Special Weather Statement.)
Advisories/ Warnings			
Winter Storm Warning Heavy Snow Warning Ice Storm Warning	___WSW___	Local NWS Office	Warnings are issued when hazardous winter weather is occurring, imminent, or highly likely over part or all of the forecast area. They are reissued whenever there is a change to the timing, areal extent, or expected condition. (If the event is expected to be limited to a specific condition, the forecaster can issue a specific warning—e.g. Heavy Snow Warning or Ice Storm Warning.)

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings (Continued)			Warnings include the: ✦ Affected area. ✦ Potential snowfall amounts, ice accumulations, wind chill, etc. ✦ Timing of the event (beginning, ending, time of heaviest precipitation or worst conditions, duration, etc.). ✦ Reason the warning was issued. ✦ Definition of a warning (especially if the event has not yet begun). ✦ Safety rules and call-to-action statement.
Winter Weather Advisory	___WSW___	Local NWS Office	An advisory is issued for winter weather situations that cause significant inconveniences but do not meet warning criteria and, if caution is not exercised, could lead to life-threatening situations. An advisory is issued for significant events that are occurring, are imminent, or have a very high probability of occurrence. An advisory should be reissued when there is a change in timing, areal extent or expected condition. If the forecaster is confident that only one type of event will occur, then an event-specific advisory can be issued (e.g., Freezing Drizzle Advisory or Blowing Snow Advisory). An advisory includes the: ✦ Affected area. ✦ Potential snow amount, ice accumulations, wind chill, etc. ✦ Timing of the event (beginning, ending, time of heaviest precipitation or worst conditions, duration, statement about skill of timing, etc.). ✦ Reason for issuing the advisory. ✦ Precautions, call-to-action statement, and potential impact.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings (Continued)			Complex weather systems may require that watches, warnings, and advisories be in effect for a variety of times and places within the Local Weather Service Office area of responsibility. In this case, all watches, warnings, and advisories are combined in the same product. Warnings are listed first, advisories are listed second, and watches last. Warnings and advisories are canceled when the weather event fails to materialize or tapers off so that the criteria no longer are met. (See Special Weather Statement for details.)
Discussions N/A			
Short Term Forecasts	___NOW___	Local NWS Office	The primary purpose of the Short Term Forecast is to provide users with a concise, non-technical, short term forecast of ongoing hydrometeorological conditions for the office's County Warning Areas (CWA). Issuance should be tied to events of significant interest as well as local media requirements. Frequency of issue should increase as a result of rapidly changing conditions. (As a general guideline, issuance should occur every hour or so when there is precipitation and more frequently during changeable or severe conditions forecasts.) The forecast includes: ✦ Hazardous conditions (e.g., winter weather including snow, freezing rain, wind, and wind chill). ✦ Non-hazardous conditions (e.g., precipitation anywhere in the office's CWA, wind and temperature variations, effects of frontal passage, and state of the sky). ✦ A brief call-to-action statement, as appropriate, to further highlight significant or hazardous conditions.

EXCESSIVE COLD

DEFINITION

What is considered an excessively cold temperature varies according to the normal climate of a region (e.g., in a relatively warm climate, temperatures just below or at freezing can be hazardous). Excessive cold may accompany or follow winter storms—or can occur without storm activity.

CHARACTERISTICS

Freezing temperatures can cause problems with burst pipes and automobiles that will not start, but the greatest danger is to people. Prolonged exposure to extreme cold can lead to frostbite, hypothermia, and death.

- **Frostbite** is damage to body tissue caused by that tissue being frozen. Frostbite causes a loss of feeling and a white or pale appearance in the extremities.
- **Hypothermia** is low body temperature. Normal body temperature is 98.6^0F. When body temperature drops to 95^0F, however, immediate medical help is needed. Hypothermia also can occur with prolonged exposure to temperatures above freezing.

Of winter deaths attributed to exposure to cold:

- 50 percent are people over 60 years old.
- Over 75 percent are male.
- About 20 percent occur in the home.

Cold air temperatures combined with wind create the wind-chill effect. Wind chill is based on the rate of heat loss from exposed skin caused by combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. Forecasters use a **wind-chill index** as a guide to heat loss resulting from wind and cold. Wind chills for given temperatures and wind speeds are shown in the table on the next page.

WIND-CHILL INDEX

	TEMPERATURES						
WIND	30	25	20	15	10	5	0
15 m.p.h.	9	2	-5	-11	-18	-25	-31
20 m.p.h.	4	-3	-10	-17	-24	-31	-39
25 m.p.h.	1	-7	-15	-22	-29	-36	-44
30 m.p.h.	-2	-10	-18	-25	-33	-41	-49

HISTORICAL EXAMPLES

- Four soldiers participating in Army Ranger training died from hypothermia in February 1995 after spending hours in chest-deep waters in a Florida swamp. Air temperatures were well above freezing, but prolonged exposure to the chilly water severely lowered their body temperatures.
- The 1993 Superstorm dumped massive amounts of snow from the Gulf Coast States northeastward through New England. Many cities experienced record low barometric pressure readings, indicative of a hurricane-force storm. In the South, many areas received record-breaking snowfalls (e.g., Birmingham, Alabama received 13 inches of snow). Fifty inches of snow fell at Mt. Mitchell in North Carolina. More than 100 hikers were rescued from the North Carolina and Tennessee mountains, many suffering from exposure, as wind chill in the southern Appalachians dropped as low as -20^{0}F. In Alabama alone, six people died of exposure after abandoning vehicles. Damages were estimated at $2 billion.
- In December 1992, a couple and their 4-month old baby got caught in their pick-up truck during a blizzard in Nevada. They waited 2 days for help, then set out on foot. After 2 days of walking, the woman and baby stayed in a cave and the man continued walking for 3 more days before reaching help. The baby survived unscathed, but the parents lost toes to frostbite and spent 2 months in wheelchairs and casts regaining their strength and the use of their legs.

PRODUCTS

The table below and on the next page lists NWS products that can provide planning and preparedness information on excessively cold conditions. Refer to the fact sheet on winter storms for other products.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks N/A			
Watches Winter Storm Watch	___WSW___	Local NWS Office	This watch is issued 12–24 hours in advance of onset and includes the: ✦ Area affected. ✦ Reasons for the watch. ✦ Potential impacts. ✦ Explanation of a watch and uncertainty. ✦ Precautions and a call-to-action statement.
Statements Special Weather Statement Cancellation of Watch	___SPS___ ___SPS___	Local NWS Office Local NWS Office	This statement highlights the impending cold temperatures. This cancels existing watches.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings			
Wind Chill Advisory	___WSW___	Local NWS Office	A Wind Chill Advisory is issued when conditions produce a non-dangerous situation that is a major inconvenience. It contains information on the: ✦ Area affected. ✦ Potential temperatures, wind chills, ✦ general impacts, and general conditions. ✦ Timing of events—beginning, peak, and ending. ✦ Reasons for the warning. ✦ Advisory definition. ✦ Precautions and call-to-action statement.
Wind Chill Warning	___WSW___	Local NWS Office	A Wind Chill Warning is issued when conditions are dangerous. It contains information on the: ✦ Area affected. ✦ Potential temperatures, wind chills, ✦ general impacts, and general conditions. ✦ Timing of events—beginning, peak, and ending. ✦ Reasons for the warning. ✦ Advisory definition. ✦ Precautions and call-to-action statement.
Discussions N/A			
Short Term Forecasts			
Short Term Forecast	___NOW___	Local NWS Office	This is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. It gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings, and advisories in effect at the time.

FOG

DEFINITION

Fog is defined as water droplets suspended in the air at the Earth's surface. Fog is often hazardous when the visibility is reduced to 1/4 mile or less.

CHARACTERISTICS

Thick fog reduces visibility, creating a hazard to motorists as well as to air traffic. Airports may close because of heavy fog.

The intensity and duration of fog varies with the location and type of fog—from early morning ground fog that burns off easily to prolonged valley fog that lasts for days. Generally, strong winds tend to prevent fog formation. The table on the next page summarizes several scenarios for the formation, intensity, and duration of fog.

CHARACTERISTICS

TYPE OF FOG	*FACTORS*	*DESCRIPTION*	*EFFECTS*
Ground Fog	✦ Clear nights. ✦ Stable air (winds less than 5 m.p.h.). ✦ Small temperature dewpoint spread.	Heat radiates away from the ground, cooling the ground and surface air. When the air cools to its dewpoint, fog forms— usually a layer of less than 100–200 feet.	Common in many areas, ground fog burns off by morning sun.
Valley Fog	✦ Cold surface air and weak winter sun. ✦ May follow a winter storm or prolonged nighttime cooling.	Fog can build to a height of more than 1,500 feet. Weak sun may evaporate lower levels of the fog but leave upper levels in place.	Found in valleys (especially in the West) in winter, valley fog can last for days, until winds are strong enough to push out the cold air.
Advection Fog	✦ Horizontal wind. ✦ Warm, humid air. ✦ Winter temperatures.	Wind pushes warm humid air over the cold ground or water, where it cools to the dewpoint and forms fog.	Advection fog can cover wide areas of the central U.S. in winter. It may be sufficient to close airports.
Upslope Fog	✦ Winds blowing up hills or mountains. ✦ Humid air.	As humid air is pushed up hills and mountains, it cools to its dewpoint and forms fog, which drifts up the mountain.	Upslope fog is common and widespread in the Great Plains, where land slopes gently upward toward the Rockies.
Sea Smoke, Steam Fog	✦ Body of water. ✦ Air much colder than water. ✦ Wind.	As cold air blows over warmer water, water evaporates into the cold air, increasing the humidity to the dewpoint. Vapor condenses, forming a layer of fog 1 to 2 feet thick over the water.	Forms on fall days over ponds and streams.
Precipitation Fog	✦ Warmer rain. ✦ Cooler air.	Some rain evaporates, and the added vapor increases the air to its dew point. The vapor then condenses into fog.	Precipitation fog forms on cool, rainy days.

HISTORICAL EXAMPLE

In March 1995, fog caused a 100-car wreck on a seven-mile bridge over Mobile Bay in Alabama, leaving 87 people injured and one person dead.

PRODUCTS

The table on the following pages lists products that can provide planning and preparedness information on fog.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks			
Fog Outlook	___SPS___	Local NWS Office	This product is issued when there is a good chance of fog occurring. It is issued at least 12 hours in advance. The primary goal of an outlook is to give advance notice. It includes the: ✦ Area of impact. ✦ Hazards. ✦ Timeframes.
Watches			
Fog Watch	___NPW___	Local NWS Office	A watch is issued when conditions are favorable for fog to develop. It covers 12-24 hours in advance. A watch includes the: ✦ Area affected. ✦ Reason for the watch. ✦ Potential impact. ✦ Explanation of the watch and uncertainty. ✦ Precautions and call to action.
Statements			
Special Weather Statement	___SPS___	Local NWS Office	A Special Weather Statement is issued to cancel a Non-Precipitation Watch.
Advisories			
Fog Advisory	___NPW___	Local NWS Office	A Fog Advisory should be issued when existing or imminent fog covers part or all of the forecast area and poses a mere inconvenience. An advisory includes the: ✦ Area and time affected. ✦ Potential impact. ✦ Timing of events—beginning, ending, peaking, and weakening. ✦ Reasons for the advisory. ✦ Advisory definition. ✦ Precautions and call to action.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Warnings Fog Warning	___NPW___	Local NWS Office	A Fog Warning should be issued when existing or imminent fog covers part or all of the forecast area and poses a threat to life and property. A warning includes the: ✦ Area and time affected. ✦ Potential impact. ✦ Timing of events—beginning, ending, peaking, and weakening. ✦ Reasons for the advisory. ✦ Advisory definition. ✦ Precautions and call to action.
Discussions N/A			
Short Term Forecasts	___NOW___	Local NWS Office	The NOW forecast is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. The NOW gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings, and advisories in effect at the time.

EXCESSIVE HEAT

DEFINITION

What is considered excessive heat varies according to the normal climate of a region. Tropical air masses can raise summer temperatures high above the average for an area. Sudden rises in temperature—when people don't have a chance to acclimatize—or prolonged heat waves increase death rates. People die from excessive heat.

Excessive heat occurs from a combination of high temperatures (significantly above normal) and high humidities. At certain levels, the human body cannot maintain proper internal temperatures and may experience heat stroke. The "Heat Index" (HI) is a measure of the effect of the combined elements on the body.

A daytime HI reaching 105°F or above with nighttime lows at or above 80°F for two consecutive days may significantly impact public safety and, therefore, generally requires the issuance of an advisory or warning by local NWS offices.

CHARACTERISTICS

There are some practical problems that can result from high temperatures, such as overheated car engines, "brown-outs" from overuse of electricity for air conditioning, and changes in airplanes' performance. As with extreme cold, however, the major danger of extreme heat is to humans and animals. Heat-related ailments can range from annoying conditions to life-threatening situations, such as:

- **Heat Cramps**. Muscle cramps, especially in the legs after exercising, are caused by imbalances in body salt.
- **Fainting.** Exercising in the heat can cause a rapid drop in blood pressure, resulting in fainting.
- **Heat Exhaustion.** Loss of fluid and salt through excessive sweating can lead to dizziness, overall weakness, and a rise in body temperature. This can result from normal activity during several days of a heat wave or strenuous activity in extreme temperatures.
- **Heatstroke.** If heat exhaustion is not treated, the body temperature may rise to 105^{0}F or more and heatstroke may occur. A heatstroke victim may exhibit lethargy, confusion, or unconsciousness and is at risk of dying.

CHARACTERISTICS

When the air is humid, the "apparent temperature" is even higher. Forecasters use the **Humidity Index** to show apparent temperature. The chart below shows the Humidity Index.

HUMIDITY INDEX

	TEMPERATURES							
HUMIDITY	75	80	85	90	95	100	105	110
40%	74	79	86	93	101	110	122	135
50%	75	81	88	96	107	120	135	150
60%	76	82	90	100	114	132	149	163
70%	77	85	93	106	124	144	161	--
80%	78	86	97	113	136	157	166	--
90%	79	88	102	122	150	170	--	--

HISTORICAL EXAMPLES

- ✦ In July 1995, a heat wave hit the Eastern and Midwestern United States. Over 475 heat-related deaths occurred in Chicago alone.
- ✦ In July 1993, a heat wave hit the Eastern United States, causing power shortages and many illnesses and deaths. For example, between July 6 and 14, there were 118 heat-related deaths in Philadelphia.
- ✦ In July 1980, a heat wave hit the Midwestern United States. In Kansas City and St. Louis, 1,448 people were killed by the heat.
- ✦ The U.S. Centers for Disease Control estimates that 5,379 people have died from excessive heat between 1979 and 1992. This is an average of 413 deaths per year.

PRODUCTS

The table below and on the next page lists NWS products that can provide planning and preparedness information on extreme heat conditions.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks Outlook for Excessive Heat	___SPS___	Local NWS Office	In extreme circumstances an outlook can be issued to include the: ✦ Advanced notice of excessive heat. ✦ Expected conditions. ✦ Locations. ✦ Timeframes.
Watches Excessive Heat Watch	___NPW___	Local NWS Office	This watch is issued 12–24 hours in advance of onset and includes the: ✦ Area affected. ✦ Reasons for the watch. ✦ Potential impacts. ✦ Explanation of a watch and uncertainty. ✦ Precautions and call-to-action statement.
Statements Cancellation of Watch	___SPS___	Local NWS Office	This product cancels an existing watch.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings			
Excessive Heat Advisory	___NPW___	Local NWS Office	An Excessive Heat Advisory is issued when the conditions produce a non-dangerous situation that is a major inconvenience. It includes the: ✦ Area affected. ✦ Potential temperatures, heat index, general impacts, and general conditions. ✦ Timing of events, including the beginning, peak, and ending. ✦ Reasons for the advisory. ✦ Advisory definition. ✦ Precautions and a call-to-action statement.
Excessive Heat Warning	___NPW___	Local NWS Office	An Excessive Heat Warning is issued when conditions are considered dangerous. The warning includes the: ✦ Area affected. ✦ Potential temperatures, heat index, general impacts, and general conditions. ✦ Timing of events, including the beginning, peak, and ending. ✦ Reasons for the warning. ✦ Advisory definition. ✦ Precautions and a call-to-action statement.
Discussions N/A			
Short Term Forecasts	___NOW___	Local NWS Office	The NOW forecast is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. It gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings, and advisories in effect at the time.

DUSTSTORMS

DEFINITION

Strong winds over dry ground that has little or no vegetation can lift particles of dust or sand into the air. These airborne particles can reduce visibility, cause respiratory problems, and have an abrasive affect on machinery. A concentration reducing the visibility to ¼ mile or less often poses hazards for travelers.

CHARACTERISTICS

Duststorms cause a significant reduction in visibility (to ¼ mile or less), cause damage and injury, and affect commerce.

There are two situations that lead to the development of blowing dust or sand:

- ✦ Sustained high wind at the surface, which tends to pick up dust and sand in dry environments. This condition may last for several hours or even days and may occur simultaneously with a windstorm. (Refer to the fact sheet on windstorms for more information.) This is referred to as a nonconvective event.
- ✦ Local events because of thunderstorm outflow or micro bursts. In this situation, the event is usually sudden and short, over in a matter of minutes. These events are referred to as convective events.

Factors affecting both nonconvective and convective events are shown in the table on the next page.

FACTOR	*LARGE-SCALE, NONCONVECTIVE EVENTS*	*CONVECTIVE EVENTS*
Speed of onset	Recognizable weather patterns are easily identified 24 to 36 hours in advance.	✦ Predictable over an area of jurisdiction within 0 to 3 hours. ✦ Specific locations identifiable only minutes in advance.
Duration	Ranges from 3 to 4 hours up to 2 to 3 days, usually with nocturnal lulls.	✦ Micro bursts—a few seconds. ✦ Macro bursts—a few minutes. ✦ Wake depression—up to two hours.
Timing	✦ Occur mainly during the late winter and early spring when pressure gradients are extreme. ✦ Conditions worsen during late morning and are most intense during late afternoon.	Occur in association with late afternoon or evening thunderstorms, usually during the spring and summer.

CHARACTERISTICS

Duststorms involve horizontal high winds or wind gusts and blowing dust, sand, or both. The hazards and damage caused by these storms include:

- Impaired visibility and breathing difficulties, especially for outdoor workers, people in recreational activities, and motorists.
- Crop damage.
- Destruction to buildings, vehicles, and trailers.
- Power outages and other infrastructure damage.
- Broken trees.
- Scouring damage to buildings and automobiles.
- Damage to computers and communications equipment from accumulated dust.

High winds may accompany major winter or early spring blizzards. A mixture of snow and dust may bring travel to a standstill. For convective duststorms, all elements associated with severe thunderstorms may occur. Refer to the fact sheet on thunderstorms for more information.

HISTORICAL EXAMPLES

- In April 1995, a duststorm caused a 24-car wreck in Arizona that killed 10 people. Swirling dust reduced visibility to less than a car length.
- In March 1975, a mixture of blowing dust and sand accompanied high winds (at times exceeding 100 m.p.h.) in the Texas South Plains. Visibility remained near zero during daylight hours for 3 days. Dust extended aloft to 30,000 feet, and visibility was reduced as far east as Atlanta. A total of 1.38 inches of dust collected in an official rain gauge at the Lubbock, Texas Weather Service Forecast Office. Commerce came to a standstill, with most highways closed due to overturned tractor trailers, blowing tumbleweeds, and the sandblasting effect on automobiles.

PRODUCTS

The following table lists NWS products that provide planning and preparedness information on duststorms. Refer to the fact sheet on windstorms for other products.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks Blowing Dust or Sand	___SPS___	Local NWS Office	This product is issued when there is a good chance of blowing dust or sand occurring. The prime goal of the outlook is to give advance notice. An outlook includes the: ✦ Area of impact. ✦ Hazards. ✦ Timeframes.
Watches Blowing Dust/Sand Watch	___NPW___	Local NWS Office	A watch is issued when conditions are favorable for blowing dust or sand to develop. It is issued 12-24 hours in advance. A watch includes the: ✦ Area affected. ✦ Reason for the watch. ✦ Potential impact. ✦ Explanation of the watch and uncertainty. ✦ Precautions and a call-to-action statement.
Statements	___SPS___	Local NWS Office	Special Weather Statements are issued to cancel Non-Precipitation Watches.
Advisories Blowing Dust/Sand	___NPW___	Local NWS Office	A blowing dust/sand advisory should be issued when existing or imminent significant events cover part or all of the area and pose a mere inconvenience. An advisory includes the: ✦ Area and time affected. ✦ Potential impact. ✦ Timing of the event's beginning, ending, peaking, and weakening. ✦ Advisory definition. ✦ Precautions and calls to action.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Warnings Blowing Dust/Sand Warning	___NPW___	Local NWS Office	A Blowing Dust/Sand Warning should be issued when existing or imminent significant blowing dust/sand covers part or all of the forecast area and is a threat to safety and property. A warning includes the: ✦ Area and time affected. ✦ Potential impact. ✦ Timing of the event's beginning, ending, peaking, and weakening. ✦ Advisory definition. ✦ Precautions and call to action.
Discussions N/A			
Short Term Forecasts	___NOW___	Local NWS Office	The NOW forecast is intended as the primary way to provide a short term forecast of hydrometeorological conditions over an area. It gives a concise forecast of the most significant weather during the next few hours. It highlights watches, warnings and advisories in effect at the time.

WINDSTORMS

DEFINITION

High winds not associated with convective events (severe local storms, hurricanes, and winter storms) require a warning when one of the following occurs:

- ✦ Sustained wind speeds of 40 m.p.h. or greater lasting for 1 hour or longer.
- ✦ Winds of 58 m.p.h. or greater for any duration.

The above thresholds generally are increased for locations at higher elevations because of the lower air density and subsequent reduction in damage from less force.

The types of wind that do not involve the mechanism of convection include:

- ✦ **Gradient High Winds.** High winds that usually cover a large area and are due to large-scale pressure systems.
- ✦ **Mesoscale High Winds.** These high winds usually follow the passage of organized convective systems and are associated with wake depressions or strong meso-scale (small-scale) high pressure.
- ✦ **Channeled High Winds.** In mountainous areas or in cities with tall buildings, air can be channeled through constricted passages producing high winds. Channeled high winds are local in nature but can be extremely strong.
- ✦ **Tropical Cyclone-Associated High Winds.** High winds can occur a few hundred miles from the coast of a landfalling tropical cyclone. These inland winds are forecasted independent of the tropical cyclone.
- ✦ **Chinook or Foehn Wind.** These are warm, dry winds that occur in the lee of high mountains ranges. They are fairly common in the mountainous West and sections of Alaska during the winter months. These winds develop in well defined areas and can be quite strong.

CHARACTERISTICS

Windstorms are caused by an extreme pressure gradient (difference in pressure over a small distance). The pressure gradient itself may be caused by one or more factors:

- ✦ Terrain effect.
- ✦ Temperature differences, as with downslope winds.
- ✦ Mesoscale systems or convective complexes.

CHARACTERISTICS

Windstorms involve sustained, potentially damaging, high winds. These high winds can cause the following hazards and damage:

- Impaired visibility.
- Crop damage.
- Destruction to buildings and vehicles.
- Power outages and other infrastructure damage.
- Broken trees.

High winds may accompany major winter or early spring blizzards. Major high-wind events frequently affect multiple jurisdictions, extending horizontally for hundreds of miles.

Windstorms are nonconvective events, and the speed of onset is less than with convective events, such as duststorms. Recognizable weather patterns are easily identified 24 to 36 hours in advance of a large scale, nonconvective storm. The NWS may issue a High Wind Watch during this period.

The duration of the event ranges from about 4 hours up to 2 to 3 days, usually with nocturnal lulls. The storms occur mainly during the late winter and early spring, when pressure gradients are extreme and soils are bare. They worsen during the late morning and become most intense during the late afternoon, when atmospheric mixing is most pronounced.

HISTORICAL EXAMPLE

A wind and duststorm along a California highway in November 1991 caused a wreck leaving 17 dead and 150 injured. This storm came during the sixth year of a drought.

PRODUCTS

The following table lists NWS products that can provide planning and preparedness information on windstorms. Refer to the fact sheet on duststorms for more information.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks Potential for High Winds	___SPS___	Local NWS Office	This product is issued when there is a good chance of high winds occurring. The timeframe is 12+ hours. The primary goal of the outlook is to give advance notice. An outlook includes the: ✦ Inherent uncertainty of the event. ✦ Area of impact. ✦ Hazards. ✦ Timeframes.
Watches High Wind Watch	___NPW___	Local NWS Office	A watch is issued when conditions are favorable for high winds to develop. It comes 12-24 hours in advance. A watch includes the: ✦ Area affected. ✦ Reason for the watch. ✦ Potential impact. ✦ Explanation of the watch and uncertainty. ✦ Precautions and calls to action.
Statements	___SPS___	Local NWS Office	Special Weather Statements are issued to cancel Non-Precipitation Watches.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories High Wind Advisory	___NPW___	Local NWS Office	A High Wind Advisory should be issued when existing or imminent high winds cover part or all of the area and pose a mere inconvenience. An advisory includes the: ✦ Area and time affected. ✦ Potential impact. ✦ Timing of events, including the beginning, ending, peaking, and weakening. ✦ Reasons for the advisory. ✦ Advisory definition. ✦ Precautions and calls to action.
Warnings High Wind Warning	___NPW___	Local NWS Office	A High Wind Warning should be issued when existing or imminent high winds cover part or all of the forecast area and pose a threat to life and property. A warning includes the: ✦ Area and time affected. ✦ Potential impact. ✦ Timing of events, including the beginning, ending, peaking, and weakening. ✦ Reasons for the warning. ✦ Warning definition. ✦ Precautions and calls to action.
Discussions N/A			
Short Term Forecasts	___NOW___	Local NWS Office	These forecasts are intended as the primary way to provide short term forecasts of hydrometeorological conditions over an area. They give a concise forecast of the most significant weather during the next few hours. They highlight watches, warnings, and advisories in effect at the time.

FIRE WEATHER

DEFINITIONS

Fire weather is a term used for the meteorological conditions that promote the spread of wildfire. Hydrological and topographical and vegetation conditions also impact the spread of fire.

Fire Weather Offices are those Weather Service Forecast Offices (WSFO) and Weather Service Offices (WSO) assigned responsibility to provide fire weather services for specified areas.

Fire Danger is the result of both constant factors (fuels) and variable factors (primarily weather) that affect the ignition, spread, and difficulty of control of fires and the damage they cause.

Prescribed Burn is fire applied to wildland fuels, in a definite place for a specific purpose under exacting weather and fuel conditions (the prescription), to achieve land management objectives.

Wildfire is any free-burning and uncontainable wildland fire not prescribed for the area that consumes the natural fuels and spreads in response to its environment.

Wildlands are any non-urbanized land not under extensive agricultural cultivation (e.g., forests, grasslands, rangelands).

CHARACTERISTICS

The following weather conditions promote ignition and rapid spread of fires:

- ✦ Low humidity.
- ✦ High winds (over 10–20 m.p.h.).
- ✦ Dry thunderstorm (i.e., lightning without rain).
- ✦ Unstable air.

Other factors that impact the spread and severity of fires include:

- ✦ **Dry, antecedent conditions**. Prolonged hot, dry conditions greatly increase fire danger. In drought conditions, forests can ignite with a weak source that would normally not be a threat.
- ✦ **Urban-wildland interface**. The spread and severity of residential areas into wildlands means the population faces a greater risk of forest fires. Coordination is necessary between urban emergency responders and land management agencies, such as the USDA Forest Service, the National Park Service, Bureau of Indian Affairs, and the Bureau of Land Management.
- ✦ **Available fuel**. The spread of fire depends on the amount of burnable material. Trees that contain oily sap, such as eucalyptus, provide tremendous fuel when dry.
- ✦ **Hilly terrain**. When other factors are even, fire spreads faster uphill than downhill.

CHARACTERISTICS

Forecasters use the **Haines Index** to indicate the potential for large fire growth. The Haines Index is shown below.

HAINES INDEX	*RISK*
2 or 3	Very low
4	Low
5	Moderate
6	High

HISTORICAL EXAMPLE

In October 1991, brush fires swept through the Oakland, California suburbs, which abutted a grassland area. Many analysts attributed the extensive damage to the century-old practice of planting eucalyptus trees in the area. Eucalyptus trees are oily and volatile, creating a serious fire hazard. Strong winds and extended drought contributed to the rapid spread of this fire. Preliminary estimates put damages between $2.5 and $5 billion. Twenty-three people died and 148 were injured.

SOURCES OF INFORMATION

The U.S. Forest Service manages fire fighting activities on National Forest land, though interagency cooperation is the rule in wildland fire fighting. Other Federal agencies that may be involved with fire management on Federal land include the:

- Bureau of Land Management.
- National Park Service.
- Bureau of Indian Affairs.
- Fish and Wildlife Service.
- Bureau of Reclamation.
- Department of Defense.

PRODUCTS

The following table lists NWS products that provide planning and preparedness information on fire weather conditions.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks Outlook and Extended Forecast	____FWF___	Local Weather Service Fire Weather Office (FWO)	This forecast is issued as part of the routine Fire Weather Forecast to cover 2 or 3 days beyond the basic forecast period. General terms are used to highlight weather elements critical to the user agency's operation. Longer range outlooks also may be issued on request for advance planning by fire managers.
Watches Fire Weather Watch	___FWF___	Local Weather Service Office FWO	This product is used to advise of the possible development of a red flag event in the near future. It is issued by a fire weather forecaster for all or any portion of his or her area of responsibility when he or she is reasonably confident that a red flag event will occur. It should be issued 12 to 48 hours in advance but not more than 72 hours in advance of the expected onset of critical weather conditions. It remains in effect until the: ✦ Forecaster determines that the event will not occur and the watch will be canceled; or ✦ Watch is upgraded to a red flag warning.
Statements Rangeland and Fire Danger Statement	___RFD___	Local Weather Service Office FWO	This product describes weather conditions as they relate to fire danger in rangeland.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings Red Flag Warning	___RFW___ ___FWF___	Local Weather Service Office FWO	This is used to warn of an impending or actual occurrence of a red flag event. It is issued by the fire weather forecaster for any portion of or all of his or her area of responsibility. The warning remains in effect until critical weather conditions cease or fail to develop as forecast. The warning includes a brief description of the conditions causing the ongoing or forecast event. A Red Flag Warning is issued solely for the purpose of advising land management agencies of critical fire weather conditions. It should not be confused with other agencies' red flag alert programs.
Discussions	___FWF___	Local Weather Service Office FWO	A discussion of relevant weather patterns is included as part of every presuppression or land management forecast.
Short Term Forecasts Spot Forecast For Wildfires and Pre-scribed Burning	___FWF___	Local Weather Service Office FWO	This forecast is a site-specific, localized forecast of weather including a detailed 12-hour forecast and an additional 12-hour outlook of the: ✦ Winds (including the time of wind shifts due to terrain effects). ✦ Maximum and minimum temperature. ✦ Maximum and minimum humidity. A Spot Forecast initially is issued only upon request. Additional forecasts or revisions are issued as necessary.

OTHER HAZARDS

INTRODUCTION

In addition to weather-related disasters, communities may also face geologic disasters (such as earthquakes and related tsunamis) and manmade catastrophes (such as terrorist events). Although all types of disasters pose similar challenges to the community, terrorist threats especially create unique problems for emergency management professionals and the population at large. This section includes a comparison of natural disasters and incidents involving weapons on mass destruction (WMD).

This section describes the characteristics of earthquakes; tsunamis; and nuclear, biological, and chemical agents used in weapons of mass destruction. Historical examples of each type of disaster are listed. For tsunamis, NWS products that can provide planning and preparedness information are described. For biological and chemical agents, tables list symptoms, incubation periods, and mortality rates.

Refer to this section when you need to know the dangers that these events potentially pose to your community.

EARTHQUAKES

DEFINITION

An earthquake is defined as the shaking of the Earth's surface, sometimes violently, following a release of energy in the Earth's crust.

CHARACTERISTICS

Over the last 25 years, scientists have concluded that the Earth is a patchwork of plates that move relative to one another, spreading apart and colliding with each other as they slowly move on top of the Earth's pliable, hot interior layers.

About 90 percent of earthquakes occur at plate boundaries. There are three types of plate boundaries:

- *Spreading zones* are areas in which molten rock is rising and pushing two plates apart. Most spreading zones are in the ocean.
- *Transform faults* occur where plates slide past one another.
- *Subduction zones* are found where one plate overrides or "subducts" another, pushing it downward into the Earth's hot mantle.

It is important to learn the basic terms used in describing earthquakes.

- The *focus* is the region where the release of energy originates.
- The *focal depth* is the distance from the focus to the surface.
- The *epicenter* is the point on the Earth's surface directly above the focus. Geologists identify earthquake location by referring to the epicenter.

To understand how earthquakes are detected, recorded, and measured, you must understand the different categories of vibrations that occur when energy is released.

- *Surface waves* travel along the Earth's surface. They have the strongest vibration and probably cause most of the damage that results from earthquakes.
- *Body waves* pass through the Earth's interior to distant points on the surface. Types of body waves include *compression waves* and *shear waves*.
- *Compression waves* travel at great speeds and ordinarily reach the surface first, so they are called *primary or P-waves*.
- *Shear waves* travel more slowly, so they are called *secondary or S-waves*.

CHARACTERISTICS

The first indication of an earthquake is a sharp thrust, indicating the compression wave has arrived. Then the shear waves arrive and the surface waves cause a "ground roll."

Scientists use a *seismograph* to record the changing intensity of these vibrations. They can use the data thus obtained to determine the time, epicenter, and focal depth of an earthquake, as well as the type of faulting that occurred and how much energy was released by the quake. Keeping this type of history of quake activity is important in predicting future events.

Scientists compare the severity of earthquakes using two different types of measurements:

- The number we hear quoted most frequently is the *Richter Scale* number, which is a measure of the amplitude of seismic waves. The scale is logarithmic, which means that an earthquake that measures 7 on the Richter Scale has ground motion 10 times as large as one with a measurement of 6. Earthquakes of 6 or more are major. Extremely strong earthquakes have magnitudes of 8 or more.
- The *Modified Mercalli Scale* is a subjective measure of strength of shock that gives specific descriptions for each of 12 gradations. For example, a level 1 is "not felt except by a very few under especially favorable conditions," while a level 12 means, "damage total. Lines of sight and level are distorted. Objects thrown upward into the air." This scale is used based on eyewitness reports and field investigations. On the Modified Mercalli Scale, the Alaska earthquake of 1964 was a 10.

Scientists also measure the amount of energy released, a figure that can be derived from seismograph records.

An earthquake's severity is not the only measurement of its destructiveness. Factors in destructiveness include:

- The **geologic conditions** in the area. If the area is underlain by sand, clay, or other relatively loose and unconsolidated material, the effects would be more noticeable because the ground is less stable.
- The **focal depth and distance from the epicenter** will be important, because earthquake effects diminish with distance.
- The **design of buildings** and other structures will make a significant difference. Protective building strategies (i.e., earthquake engineering) play a major role in mitigating the damage from earthquakes.
- Finally, the more people and property that are at risk in the area, the higher losses could climb.

HISTORICAL EXAMPLES

- The New Madrid earthquakes of 1811–1812, which occurred in a fault zone along the Mississippi River, were the most widely felt earthquakes in the recorded history of North America. Aftershocks were felt as far away as Boston. The area was sparsely populated, however, so damage was relatively slight. The same earthquake today would affect millions of people and cost billions of dollars.
- The San Francisco earthquake of 1906, by contrast, was a much weaker earthquake than New Madrid, but the quake killed nearly 800 people and left the city in ruins. Much of the damage occurred in the major fire that followed the quake, which left 250,000 people homeless.

TSUNAMIS

DEFINITION

A tsunami is a series of ocean waves of extremely long length, generated by disturbances from earthquakes, underwater volcanic eruptions, or landslides occurring below or near the ocean floor.

CHARACTERISTICS

From wave crest to wave crest, the length of a tsunami may be 100 miles or more in the deep ocean, with a wave height of only a few feet or less. The waves may reach speeds of up to 500 m.p.h. As tsunamis approach land and the water depth decreases, wave heights may increase to between 30 and 100 feet. Tsunamis from nearby earthquakes may take only a few minutes to reach coastal areas, but may take up to 24 hours from distant earthquakes.

The deep ocean trenches off the coasts of the Aleutian Islands, Japan, and South America are known for their underwater earthquakes and are the source for many tsunamis.

Hazards from tsunamis include coastal flooding and damage from debris. The flood inundation area from a tsunami may be extensive, as tsunamis can travel up rivers and streams that lead to the ocean. Defining the extent of worst-case flooding is an important aspect of preparing for tsunamis.

HISTORICAL EXAMPLES

- ✦ A tsunami in Nicaragua in 1992 was generated from movement occurring beneath the ocean floor. This "slow" earthquake generated a devastating tsunami with localized damage to coastal communities in Nicaragua.
- ✦ In March 1964, a tsunami hit Alaska following an earthquake in the sea floor beneath Prince William Sound. The tsunami hit the coast between 20 and 30 minutes after the quake, devastating villages. Damages were estimated to be over $100 million. Approximately 120 people drowned.
- ✦ A 1960 Chilean earthquake generated a Pacific-wide tsunami that caused widespread death and destruction in Chile, Hawaii, Japan, and other areas in the Pacific.

PRODUCTS

The International Tsunami Information Center (ITIC), run jointly by the NWS and the Intergovernmental Oceanographic Commission, is the primary source for non-operational tsunami information.

The purpose of the ITIC is to**:**

- ✦ Locate and size major earthquakes in the Pacific Basin.
- ✦ Determine their potential for generating tsunamis.
- ✦ Predict tsunami wave arrival times and, when possible, runup on the coast.
- ✦ Provide timely and effective tsunami information and warnings to the population of the Pacific to reduce the hazards of tsunamis, especially to human life.

NWS operates two tsunami warning centers: the **Alaska Tsunami Warning Center** (ATWC) and the **Pacific Tsunami Warning Center** (PTWC) in Hawaii.

The PTWC carries the responsibility for regional, national and international warning services while the ATWC has only regional responsibility.

Area of Responsibility (AOR)—the geographical area within which a center has the responsibility for the dissemination of tsunami watches, warnings, and information bulletins and the provision of interpretive information to emergency managers and other officials.

- ✦ The **ATWC,** located in Palmer, Alaska, is the regional center for:
  - ✧ Alaska.
  - ✧ British Columbia.
  - ✧ Washington.
  - ✧ Oregon.
  - ✧ California.
- ✦ The **PTWC,** located at Ewa Beach, Oahu, Hawaii, is:
  - ✧ The regional center for Hawaii.
  - ✧ The national center for the United States.
  - ✧ The international center for the Pacific.

Regional Tsunami Warning Center—a center that is responsible for the detection of tsunamis in the ocean basin that pose a threat within its regional AOR.

PRODUCTS

National Tsunami Warning Center—a center that is responsible for the detection of tsunamis in the ocean basin that pose a threat to U.S. National interests outside of a regional AOR.

The International Warning System provides watch/warning services to all of the nations of the Pacific who are members of the International Coordination Group for the TWS in the Pacific (ICG/ITSU) or those who provide the Tsunami Warning Service with supporting data.

The table below and on the following pages lists NWS products that can provide planning and preparedness information on tsunamis.

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Outlooks N/A			
Watches Regional Tsunami Watch	ANCTSUPAQ (Alaska) HNLTSUCP (Pacific)	Alaska and Pacific Tsunami Warning Centers	This product is a bulletin issued initially using only seismic information to alert all within one to three hours travel time beyond the tsunami warning area. The watch is expanded hourly until it is canceled or upgraded by issuing a Pacific-wide Warning. A watch may be included in the text of the message that disseminates a Regional Tsunami Warning.
Statements N/A			

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings			
Regional Tsunami Warning	ANCTSUPAQ (Alaska) HNLTSUCP (Pacific)	Alaska (ATWC) and Pacific (PTWC) Tsunami Warning Centers	This bulletin usually is based only on seismic information without tsunami confirmation and is issued as a means of providing the earliest possible alert to the population near the epicentral area of an earthquake. It places the restricted area (2- to 3-hour tsunami travel time) in a condition that requires all coastal areas in the region to be prepared for imminent flooding from a tsunami. Subsequent warning bulletins that incrementally expand the warning area are issued at least hourly or when conditions warrant until the warning is either upgraded to a Pacific-wide Warning or canceled.
Pacific-wide Tsunami Warning	HNLTSUCP	PTWC	This warning is issued by the PTWC after confirmation has been received that a tsunami has been generated that has caused damage at distances greater than 1000 km from the epicenter and thus poses a threat to any populated area within the Pacific Basin that is located within the PTWC's area of responsibility.
Tsunami Advisory	ANCTSUPAQ	ATWC	This bulletin is issued to advise interested persons within its area of responsibility that the Pacific Tsunami Warning Center has issued a tsunami warning for an earthquake whose epicenter is located outside of the Alaska Tsunami Warning Center Area of Responsibility (AOR) and more than six hours tsunami travel time from any part of the ATWC AOR, and that ATWC will continue to monitor the event, issuing hourly updates. The advisory will be continued, upgraded to a watch or warning, or canceled.

PRODUCTS

PRODUCT	*IDENTIFIER*	*SOURCE*	*DESCRIPTION*
Advisories/ Warnings (Continued) Tsunami Information Bulletin	ANCTSUPAQ HNLTSUCP	ATWC PTWC	This product is issued by both the ATWC and the PTWC to advise participants of the occurrence of an earthquake in the Pacific or near-Pacific area with the evaluation that a potentially destructive tsunami was not generated. If the evaluation indicated the possible generation of a non-destructive tsunami, an investigation is initiated and additional tsunami information bulletins are issued until the investigation is concluded.
Discussions N/A			
Short Term Forecasts N/A			

TERRORIST THREATS

DEFINITION

As used in Presidential Decision Directive 39 (PDD-39), terrorism involving weapons of mass destruction refers to "nuclear, biological, or chemical (NBC) materials or weapons used by terrorists."

CHARACTERISTICS

- The Department of Defense (DoD) estimates that as many as 26 nations may possess chemical agents and/or weapons, and an additional 12 may be seeking to develop them.
- The Central Intelligence Agency (CIA) reports that at least 10 countries are believed to possess or be conducting research on biological agents.
- In recent years, the largest number of terrorist incidents within the United States has occurred in the Western United States and Puerto Rico. Attacks in Puerto Rico accounted for about 60 percent of all terrorist incidents that occurred on United States territory between 1983 and 1991.
- In the United States, most terrorist incidents have involved small extremist groups who use terrorism to achieve a designated objective. Local, State, and Federal law enforcement officials monitor suspected terrorist groups to try to prevent or protect against a suspected attack.
- A terrorist attack can take several forms, depending on the technological means available to the terrorists, the nature of the political issue motivating the attack, and the points of weakness of the terrorist's target. Bombings are the most frequently used terrorist method in the United States.
- Most local emergency management systems need enhanced capabilities to manage the threat or use of Weapons of Mass Destruction (WMD). Issues that may be commonly encountered include:

  - Difficulty in identifying the agent.
  - Determining the most appropriate means of protection.
  - Decontaminating and treating (victims, incident sites, and the environment).
  - Identifying and providing appropriate treatment (initial and definitive).
  - Identifying and providing diverse collateral requirements (public safety, mental health, etc.).
  - Determining the appropriate disposition of the deceased.

- There may be no advance warning of a chemical or biological attack. The first indication of an attack may be when people begin to exhibit advanced symptoms.
- Chemical and biological agents usually move through the air. Ventilation systems in buildings or transportation facilities may help to speed dissemination by carrying the agent far from its initial source.
- Many chemical agents pose an immediate threat to life. Antidotes are available for some, but not all, chemical agents, but must be used within minutes of exposure. In many cases, additional extensive medical emergency treatment is required, especially resuscitation.

CHARACTERISTICS

- Once disseminated, chemical agents require decontamination, tying up resources and increasing media attention.
- Some incidents may appear initially to be more routine HazMat incidents, and only later found to be terrorist incidents. At that point, the situation will change, and the incident site will be designated a crime scene.
- Local first responders may not be trained in responding to biological or chemical WMD and will not always have the appropriate protective equipment. Because of lack of knowledge and awareness in treating such events, first responders may become victims themselves.
- The number of potential casualties and the extent of the areas involved can quickly overwhelm local capabilities.
- There is an increased concern about how to deal with the threats posed by weapons of mass destruction. A WMD incident challenges the confidence of emergency response personnel and the capacity of the health care system.
- Most local emergency systems require an enhanced capability system to manage a WMD threat. They require a capability for agent identification, personal protection, decontamination, and effective initial and definitive methods of treatment.
- Health systems for response to WMD incidents require the capability for: agent identification, safe extraction, and antidote administration; victim decontamination, triage, and primary care; emergency medical transportation; local and regional definitive medial care; forward movement of victims for additional care; and appropriate disposition of the deceased. Health systems personnel must also ensure decontamination of the incident site to safe levels.
- The political pressure surrounding a WMD event can be intense. Public officials will experience anger and frustration from the public's feelings of helplessness.
- Local officials must plan for the unexpected. Key personnel may be out of town or unable to handle the pressure. Other factors, such as adverse weather, may delay the arrival of assistance from outside sources.
- The public is likely to panic because of its unfamiliarity with the event. It is important to have accurate health-related information available.
- Rapid response is required to save lives. During chemical incidents, immediate response and appropriate action within the first 30 to 90 minutes is crucial.

These points provide the context for the Nunn-Lugar-Domenici legislation and its resulting training, the formation of Metropolitan Medical Strike Teams, and the provision of NBC equipment from the Department of Defense.

HISTORICAL EXAMPLES

WMD events—and threats of WMD events—have increased dramatically since 1970, rising from a single incident in the 1970s to three in the 1980s, to an exponential increase in the 1990s. Descriptions of some of these incidents and potential incidents are listed below.

- In 1972, members of a U.S. Fascist group called Order of the Rising Sun were found to be in possession of 30-40 kilograms of typhoid bacteria cultures, with which they planned to contaminate water supplies in Chicago, St. Louis, and other Midwestern cities.
- In 1984, two members of an Oregon cult headed by Bhagwan Shree Rajneesh cultivated salmonella (food poisoning) bacteria and used them to contaminate restaurant salad bars in an attempt to affect the outcome of a local election. Although some 751 people became ill and 45 were hospitalized, there were no fatalities.
- The World Trade Center is the second largest building in the world and houses 100,000 workers and visitors each day. On February 29, 1993, a bombing in the parking garage of the World Trade Center in New York City resulted in the deaths of five people and injuries to thousands. The bomb left a crater 200 by 100 feet wide and five stories deep.
- In March 1995, four members of the Minnesota Patriots Council, a right-wing militia organization advocating violent overthrow of the U.S. government, were convicted of conspiracy charges under the Biological Weapons Antiterrorism Act for planning to use ricin, a lethal biological toxin. The four men—Douglas Baker, Richard Oelrich, Dennis Henderson, and Leroy Wheeler—allegedly conspired to assassinate federal agents who had served papers on one of them for tax violation.
- In May 1995, Larry Wayne Harris, a member of the neo-Nazi organization Aryan Nations, was arrested in Ohio on charges of mail fraud and fraud by wire after allegedly misrepresenting himself when ordering three vials of freeze-dried yersinia pestis, the bacteria which causes bubonic plague, from a Maryland biological laboratory.
- In December 1995, Thomas Lewis Lavy from Arkansas was charged with possession of the toxin ricin in violation of the Biological Weapons Antiterrorism Act of 1989. In 1993, Canadian customs officials had intercepted a stack of currency with a white powder interspersed between the bills. Suspecting cocaine, customs had the material analyzed, and discovered that it was not cocaine but ricin. Lavy was arrested and the next day hanged himself in his jail cell.
- In the Centennial Olympic Park-Olympic Games bombing in Atlanta, Georgia, on July 27, 1996, there were two deaths and 110 injuries.
- In April 1997, Russian police arrested a group which tried to sell 11 pounds of uranium-235 stolen from a production plant in Kazakstan. It takes several pounds of enriched uranium to make a nuclear weapon.

COMPARISON OF WMD AND NATURAL DISASTERS

A brief comparison of the characteristics of WMD incidents with those of natural disasters. By drawing on the similarities between WMD and non-WMD incidents, local officials can focus on these aspects that are different—the "NBC Delta."

SIMILARITIES	*DIFFERENCES*
✦ May occur without warning. ✦ May involve mass casualties. ✦ May included property damage.	✦ Will always be a crime scene. A WMD incident is a deliberate attack designed to maim and kill. ✦ May not be immediately recognizable. Many chemical and biological agents promote symptoms that are similar to other types of illnesses. ✦ May not be a single event. There may be multiple incident sites with a WMD event. ✦ Place responders at higher risk. Secondary devices may target first responders. ✦ May expand geometrically. NBC agents are far more toxic than the hazardous materials typically found at a HazMat incident. ✦ Will instill public panic.

NUCLEAR TERRORISM

Few ideas instill as much fear as the thought of nuclear capability in the wrong hands. Since the end of the Cold War, there has been an increase in the amount of radioactive material available and a growing variety of ways in which terrorists can access radioactive substances. The amount of weapons-grade fuel that remains from the dismantling of the former Soviet nuclear forces alone is estimated to be in excess of 10,000 kilograms (kgs) of plutonium and 500,000 kgs of weapons-grade uranium. During the next five years, nuclear power plants are expected to produce 110 metric tons of plutonium, and by the year 2000, there will be twice as much plutonium in civilian sectors as that possessed by the military. This material can be bought on the black market, stolen, hijacked in transit, or acquired by bribing disgruntled employees in the military or scientific communities.

While little probability exists that a terrorist organization would be capable of producing a nuclear warhead, the alternative is simply to construct an explosive device that disperses radioactive materials. To date, there have been a few cases of radioactive dispersal attacks, including incidents in both Austria and France, and in the State of Texas.

The most feasible, and therefore most likely, form of nuclear terrorism is a direct assault on a nuclear facility, such as a power station. Considering the amount of radiation housed at such a facility, the magnitude of a single attack of this kind could exceed more than 100,000 deaths and the ruin of the surrounding land for decades.

PENETRATION

An attack on a nuclear plant could result from penetration of the facility. For example, on February 7, 1993, an intruder was discovered to have penetrated the Three Mile Island Nuclear Generating Station near Harrisburg, Pennsylvania. The intruder, a 31-year-old man who suffered from depression, drove into the guarded entrance, crashed his car through a fence and a roll-up door, and proceeded 63 feet inside of a turbine building. The plant continued to operate at full power while the staff monitored gauges and alarms. All access doors were locked by computer control, yet the Nuclear Regulatory Commission (NRC) knew that this measure would delay an intruder armed with a satchel charge by only 15 seconds. This intruder was arrested four hours later. The NRC's Incident Investigation Team (IIT) found more than 40 problems with the response of the staff, and concluded, ". . . the strategies used . . . would not have precluded an individual . . . from reaching and attempting to enter the vital area before being interdicted by armed responders."

Other attempts at penetration of nuclear facilities have included:

- North Korea. Four North Korean commandos were killed by a South Korean naval patrol when they attempted to come ashore near a nuclear power plant.
- South Africa. At the Koeberg plant near Cape Town, guerillas penetrated the heavily guarded plant and damaged the control room.
- France. Attackers launched rocket-propelled grenades and anti-tank missiles at the Super Phoenix plant.

SABOTAGE

Nuclear plants can be threatened also by sabotage. Some examples of this type of threat have occurred in:

- Virginia. Control room operators at the Surry plant poured sodium hydroxide onto new fuel assemblies.
- New Jersey. Someone intentionally tripped a steam generator feedwater pump. This event imitated the Three Mile Island trip that had led to a serious accident at that plant.
- Pennsylvania. A major portion of the emergency core cooling system was disabled at the Beaver Valley nuclear plant.
- New York. Someone sabotaged the emergency diesel generators at the Nine Mile Point Reactor.
- Idaho. A worker intentionally caused a damaging condition known as a "power excursion" by withdrawing a control rod too far. The resulting steam explosion destroyed the reactor, killing the saboteur and two other workers. The event was classified a murder/suicide.
- Texas. Central alarm station wires were cut at the South Texas plant by an employee who was about to be laid off.
- Illinois. A firewatch employee at the Braidwood facility vandalized wires and fireproofing.
- Florida. An employee suspected of being disgruntled because of alleged cost-cutting measures poured glue into three lockable switches on the backup control panel at Florida Power and Light Company's St. Lucie nuclear power pant.

TRUCK BOMBS

Shortly after the bombing of the U.S. marine barracks in Beirut (1984), the NRC commissioned "An Analysis of Truck Bomb Threats at Nuclear Facilities," which was performed by the Sandia National Laboratories. One of the results of the analysis was that, at some plants, a large bomb that is detonated offsite could cause enough damage to lead to a deadly release of radiation or even a meltdown. Some plants, however, are too small to erect barriers with proper setback distances to preclude this kind of attack.

LOST AND STOLEN NUCLEAR MATERIALS

Radioactive sources are lost, stolen, mistakenly shipped, or illegally discarded regularly in the United States. The potential exists for some of these sources to be intentionally placed to cause harm.

LOST AND STOLEN NUCLEAR MATERIALS

Cases of lost, stolen, mistakenly shipped, or illegally discarded radiation sources occurred in:

- Ohio. Cesium-137 was found in the trunk of a crushed car at a scrapyard in Cincinnati.
- Pennsylvania. 33,000 shovel blades were made of steel contaminated with radioactive thorium near Harrisburg.
- Indiana. Radioactive iodine was found in diapers at a garbage dump in Indianapolis.
- Pennsylvania. A plutonium pacemaker was reported missing by a hospital near Philadelphia.
- Minnesota. A hospital in Minneapolis received three radioactive-contaminated packages from the same corporation within two months.
- Arizona. Five men were videotaped stealing radioactive tritium from a glow-in-the-dark exit sign at Arizona State University.
- Unknown location. A huge source-term of radioactive iridium was reported lost in shipment by a private courier.
- California. A package of radioactive Xenon was lost when it fell out of an unsecured back door of a private delivery service's van in Sacramento.
- Michigan and Massachusetts. Packages of radioactive thallium fell from the vehicles of a private delivery service and were struck by cars, releasing their contents.
- Virginia. A Russian-produced fuel assembly with 12 fuel rods containing 2% enriched uranium was unaccounted for by a U.S. crew in Lynchburg.

COMMUNITY IMPACT

A nuclear terrorist strike on a community would have multiple impacts. A successful attack, whether by penetration, sabotage, or truck bomb, on a facility such as a nuclear power plant would cause widespread destruction and render the area uninhabitable for the foreseeable future.

Given warning, evacuation of a population within the threatened radius would require a massive effort, considering that schools, hospitals, nursing homes, and prisons could be affected. Transportation and shelter requirements could place a tremendous strain on both the endangered community and those that surround it. Provisions for medical treatment and handling of contaminated material and human remains would tax personnel and facilities. The spread of panic through rumors and misinformation could hinder an effective response.

The structural damage that could result from an explosion intended to release radioactive material could pose additional danger. A bomb on a rail car, in a subway, or at an airport would close those routes of transportation for an extended period of time. Bridges, overpasses, and tunnels could not only be contaminated but could be incapacitated as means of ingress and egress.

Long-term health effects from the exposure to radiation would be a consideration, and long-term cleanup efforts would be costly.

PREPAREDNESS THROUGH PLANNING

Because a nuclear terrorist strike would have such widespread community impact, local officials must be aware of the potential for such an attack. Effective planning, along with coordination among local, State, and Federal agencies for the response to a survivable nuclear radiation attack, is essential to a successful response.

BIOLOGICAL TERRORISM

In April and May of 1979, an anthrax epidemic broke out among residents in the city of Sverdlovsk in the former Soviet Union. Soviet officials claimed at the time that the outbreak stemmed from contaminated meat. The windborne spread of anthrax caused a 6-week epidemic that claimed approximately 66 lives. Some of the deaths occurred at victims' homes, in the streets, and in fields. Soviet officials later admitted that the incident resulted from leakage from a biological weapons facility.

Anthrax, along with several other biological agents, can be adapted for use as terrorist weapons. These agents pose very serious threats because they can be produced easily and inexpensively, and they can spread rapidly, potentially causing a devastating number of casualties.

COMMUNITY IMPACT

The deliberate release of a biological agent such as anthrax would have a highly debilitating and largely unpredictable impact within a community. The probable choice of a densely populated, highly visible target, such as a place of public assembly, public building, mass transit system, or an area with historical or symbolic significance, would imperil great numbers of people in and beyond the target area and overwhelm the support systems that serve them.

Because some of the symptoms of biological agent infection are common to many diseases, diagnosis and treatment of mass casualties are extremely difficult. (In the Soviet incident, medical personnel who transported victims often made an initial diagnosis of pneumonia.) The lag time from exposure to the exhibition of initial symptoms and signs, coupled with the potential for misdiagnosis, could enable widespread dispersion of victims, far beyond the initial target area and for an unpredictable period of time after the release, depending on the incubation period of the disease and the number of people initially infected. In some cases, treatment of victims after the exhibition of symptoms and signs and delays in diagnosis could prove fatal to great numbers of people. For example, almost all cases of inhalation anthrax in which treatment begins after the exhibition of symptoms and signs result in death, regardless of treatment.

A widespread outbreak of an infectious disease would threaten the ability of emergency and medical facilities to respond. Personnel within these facilities should be at risk of infection themselves, especially prior to a certain diagnosis of the disease. (For biological warfare agents, concern for person-to-person contamination is limited to two agents: smallpox and pneumonic plague.) The collection and disposal of contaminated material, including human remains, would present additional long-term problems.

The psychological effects of a biological agent release could have a severe impact. A panic response by the population, including potentially widespread psychosomatic reactions, would magnify the crisis by further overwhelming treatment facilities and possibly clogging transportation systems in the search for treatment or escape from a perceived target area. Also, the sense of obligation to provide immediate assistance could endanger untrained or unprotected personnel who would be compelled to deal with an unknown, highly transmissible disease. Trained healthcare personnel employing proper protective practices for airborne (e.g., TB) and bloodborne (e.g., HIV) diseases could expect to care for patients safety with negligible risk.

PREPAREDNESS THROUGH PLANNING

There is no reasonable means of protecting a city's population against the effects of a release of a biological agent. Vaccination of a population not specifically at risk against so many potentially harmful agents is impractical, as is continuous wear of personal protective equipment (PPE). Furthermore, no known means of immunization exists for several of the recognized agents. As was the case in the Soviet Union, the responsibility for first response to a biological release on a civilian population will be that of local officials. Local public health authorities and private health care providers must be aware and vigilant and communicate with each other where and when suspicious cases arise. Only by early diagnosis and communication of suspicion and developing a detailed plan to combat an attack of this nature will officials be able to respond effectively.

Essential to the planning process is an awareness of the agents that exist, their symptoms, incubation periods, limitations on laboratory diagnosis and mortality rates. The following listing of common biological agents includes these aspects of each agent.

However, as a local official, you should ensure that your city has several persons whom you can rely on for specific information about these and other biological agents.

AGENTS	SYMPTOMS	INCUBATION PERIODS	UNTREATED MORTALITY RATES
Bacterial Agents			
Anthrax (*B. anthracis*)	Fever, malaise, fatigue, cough and mild chest discomfort followed by severe respiratory distress with painful breathing, sweating, wheezing, and cyanosis	1–6 days	Skin: 5–20% Respiratory: 100%
Plague ✦ Bubonic ✦ Pneumonic	Malaise, high fever, and tender lymph nodes High fever, chills, headache, coughing up blood, and toxemia, progressing rapidly to painful breathing, wheezing, and cyanosis	2–10 days 2-3 days	50% 100%
Bacterial/Viral Agent			
Q-Fever (rickettsia)	Fever, cough, and chest pain	>10 days	Less than 1%
Viral Agents			
Smallpox	Malaise, fever, rigors, vomiting, headache, backache, and lesions	7–17 days	30%
Viral Hemorrhagic Fevers (Ebola, Marburg, Lassa, Rift Valley, Dengue, etc.)	Fever, bleeding, vomiting, and diarrhea	3–21 days	Up to 90%, depending on the virus
Venezuelan Equine Encephalitis (VEE)	Malaise, fever, rigors, headache, nausea, vomiting, cough, sore throat, and diarrhea	2–6 days	Less than 1%

PREPAREDNESS THROUGH PLANNING

AGENTS	SYMPTOMS	INCUBATION PERIODS	UNTREATED MORTALITY RATES
Toxins			
Staphylococcus Enterotoxin B (SEB) (Cytotoxin)	Fever, chills, headache, aches, and cough if inhaled; nausea, vomiting, and diarrhea if swallowed	3-12 hours	Less than 1%
Botulinum (Neurotoxin)	Weakness, dizziness, dry mouth and throat, blurred and double vision, descending paralysis, and respiratory failure	24 hours to several days	60%
Ricin	Weakness, fever, cough, and hypothermia	4-8 hours	High, with death occurring after 36–72 hours

The health and medical community has developed initial guidelines for prevention and/or treatment of these agents. Consult with local public health authorities and medical care providers for more information about prevention and treatment.

CHEMICAL TERRORISM

In June 1994, terrorists released the nerve agent sarin outside an apartment building in the city of Matsomoto, Japan. Then, on March 20, 1995, the same agent was released in the Tokyo subway system, causing more than 5,500 people to seek medical attention. Although no episodes involving chemical weapons of mass destruction have occurred in the United States to date, the threat was made to release sarin at Disneyland on Easter Sunday 1996. With the processes for synthesis of chemical warfare agents available as readily as on the Internet, the potential for a chemical attack in this country cannot be discounted.

COMMUNITY IMPACT

The deliberate release of a chemical warfare agent, such as sarin, would have a highly debilitating and largely unpredictable impact within a community. The probable choice of a densely populated, highly visible target, such as a place of public assembly, public building, mass transit system, or a location with historical or symbolic significance, would imperil large numbers of people in the target area and incapacitate the support and infrastructure systems that serve them. The victims in the target area could suffer the effects of certain chemical attacks within seconds, requiring immediate evacuation and treatment. Conversely, some agents have a more delayed effect, causing casualties hours or days after the initial impact of an attack would seem to have subsided, thus widely enlarging the area of impact.

The evacuation and treatment of the known victims of a chemical release, with the inherent risk of contamination, would tax the community's emergency transport system and medical facilities. Further, positive identification of the agent is a difficult task because, as in the case of sarin, some liquid agents can evaporate, leaving little, if any, trace. Local health officials may be required to make a decision to provide immediate treatment for victims based on information at hand, rather than wait for positive identification of the agent. The collection and disposal of contaminated material, including human remains, would present additional problems.

Introduction of a chemical agent into a vital segment of a community's infrastructure would not only incapacitate that segment, but also could be a means for further dissemination of the agent. For example, in the Tokyo incident, liquid sarin was placed on the floor of subway cars. When an agent is dispersed inside in this manner, its vapor will remain until it is ventilated away. If, however, an agent is placed inside of a ventilation system, the system itself could disseminate the agent, contaminating the entire structure that it serves. An agent introduced into the ventilation system of a large medical facility would incapacitate the means of treatment and endanger both those who seek aid and those who provide it. A secondary attack of this type could imperil those who might seek shelter (e.g., in a public building) or a means of escape (e.g., in a public transportation system).

The psychological effects of a chemical weapons attack could have a severe impact on the community well. The implications of such an attack could cause panic among a wider population than actually is affected, with greater numbers of people seeking treatment than have been physically harmed. For instance, although 5,500 people sought medical attention after the sarin attack in Tokyo, only 1,000 were actual casualties, and most had mild effects. Hysterical citizens could clog medical facilities, hampering the treatment of the victims suffering physical effects of the agent and overwhelming crisis management capabilities.

COMMUNITY IMPACT

The unpredictability of a chemical attack with regard to the choice of target, the ability to identify the agent, the danger of widespread contamination, the damage to infrastructure, and the reaction of victims and responders requires a predictable and effective emergency response.

PREPAREDNESS THROUGH PLANNING

Because there is no known means of protection of the civilian population against the effects of chemical agents—an impracticality for populations not specifically at risk—preparedness for a potential release of chemical agents is essential. [**Note**: First responders can protect themselves with the use of personal protective equipment (suits, masks, etc.).] Although, historically, chemical warfare agents have been considered a military responsibility, the first response to their release on a civilian population in an American city will be the responsibility of local officials, as it was in Tokyo. Only by developing a detailed plan to combat an attack of this nature will officials be able to respond effectively.

Essential to the planning process is an awareness of the agents that exist, their symptoms, and the hazards that they would present to the community. The following list of common chemical agents includes these aspects of each agent.

However, as a local official, you should ensure that your city has several persons whom you can rely on for specific information about these and other chemical agents.

AGENTS	PERSISTENCY (BY AGENT)	SYMPTOMS (ALL AGENTS)		HAZARDS (ALL AGENTS)
Nerve Agents				
✦ GA (Tabun) ✦ GB (Sarin) ✦ GD (Soman)	✦ Minutes to hours ✦ Minutes to hours ✦ Hours	✦ Pinpointing of pupils ✦ Dimness of vision ✦ Runny nose/salivation ✦ Tightness of chest ✦ Difficulty breathing ✦ Twitching and/or paralysis	✦ Tachycardia ✦ Vomiting ✦ Loss of consciousness ✦ Convulsions ✦ Incontinence ✦ Death	✦ Respiratory dose is effective within seconds to minutes. Skin dose is effective within minutes to hours. ✦ Extremely toxic lethal agents
✦ VX	✦ Hours to days	✦ Sweating ✦ Nausea, vomiting, and diarrhea. ✦ Loss of consciousness	✦ Convulsions ✦ Incontinence ✦ Death	✦ Predominantly a liquid hazard. Effective 10 minutes to 18 hours after exposure.
Blister Agents				
✦ H (Mustard) ✦ HD (Mustard) ✦ HN (Mustard)	✦ Hours to days ✦ Hours to days ✦ Hours to days	✦ Reddening of skin ✦ Blisters ✦ Eye pain and reddening	✦ Eye damage ✦ Coughing ✦ Airway irritation and damage	✦ Damage begins within minutes. ✦ Eye effects may appear in a few hours, respiratory effects and blisters in 2-24 hours. ✦ Lethal in large doses
✦ L (Lewisite)	✦ Hours to days	✦ Immediate pain or skin irritation	✦ Other symptoms similar to the H agents	✦ Immediate pain. Other symptoms in about 12 hours. ✦ Lethal in large doses ✦ Immediate pain and damage to eyes, skin, and airways.
✦ CX (Phosgene Oxime)	✦ Hours to days	✦ Immediate burning	✦ Eye and airway irritation and damage	✦ Immediate pain and damage to eyes, skin, and airways. ✦ Lethal in large doses
Blood Agents				
✦ AC (Hydrogen Cyanide) ✦ CK (Cyanogen Chloride)	✦ Minutes to hours ✦ Minutes to hours	✦ Cherry red skin or lips (Caucasians only) ✦ Blue lips (African American or dark-skinned people) ✦ Rapid breathing	✦ Dizziness ✦ Nausea, vomiting ✦ Headache ✦ Frothing ✦ Convulsions ✦ Death	✦ Can cause death within 6-8 minutes.
Choking Agents				
✦ CG (Phosgene)	✦ Minutes to hours	✦ Eye and airway irritation ✦ Dizziness ✦ Tightness of chest	✦ Choking ✦ Vomiting ✦ Delayed pulmonary edema	✦ Effects are delayed several hours. ✦ In very high doses can result in death after several days.
✦ Chlorine	✦ Minutes to hours	✦ Coughing		✦ Effects begin seconds after exposure.

FINAL EXAMINATION

Instructions: Review the course materials carefully before you take this Final Examination. For each item, circle the letter that corresponds to the answer that is most accurate.

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1. FEMA helps plan, coordinate, and manage disaster assistance activities including _____, response, recovery, and mitigation.

   a. planning
   b. preparedness
   c. awareness campaigns
   d. outreach

2. One of FEMA's goals is to create an emergency management partnership with (check all that apply):

   a. Other Federal agencies.
   b. State and local governments.
   c. Volunteer organizations.
   d. The private sector.

3. FEMA (circle all that apply):

   a. Coordinates Federal aid for Presidentially declared emergencies.
   b. Chairs the Emergency Food and Shelter National Board.
   c. Develops community awareness programs for weather emergencies and home safety.
   d. Oversees the operation of the National Emergency Managers Association.

4. Of the seven major FEMA program offices, the Mitigation Directorate provides _____ revision, distribution, storage, and print processing.

   a. Fire service field guides.
   b. Flood map.
   c. Training manual.
   d. Outreach materials.

5. The _____ Directorate is responsible for the oversight of the Emergency Management Institute (EMI).

   a. Response and Recovery
   b. U.S. Fire Administration
   c. Preparedness, Training and Exercises
   d. Information and Technology Services

6. FEMA's Regional Offices are the primary sources through which FEMA's policies, programs, and program objectives are delivered and accomplished at the Regional, State and local levels.

   a. True b. False

7. The 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act, which provides the authority for FEMA's role in managing Federal disaster assistance, includes grants for (check all that apply):

   a. Temporary housing.
   b. Costs of restoration to pre-disaster conditions.
   c. Debris removal.
   d. Mitigation efforts against technological disasters.

8. Under the Stafford Act, emergencies involve any event for which the President determines that there is a need to supplement State and local efforts to save lives, protect property and public health, and _____.

   a. Ensure safety.
   b. Restore habitability.
   c. Prevent economic losses.
   d. Marshal resources.

9. In many States, the Governor can _____ if it is determined that the law in question will restrict or prohibit efforts to relieve human suffering caused by the disaster.

   a. Declare a state of emergency.
   b. Suspend local ordinances.
   c. Request initial response resources.
   d. Use the National Guard.

10. When a State emergency is declared, the Governor can establish control over wages in the affected area.

    a. True b. False

11. After the President declares a major disaster, the FEMA Regional Director and the State Governor prepare the _____.

    a. Contract.
    b. Mutual Aid Compact.
    c. FEMA-State Agreement.
    d. Damage assessment.

12. The Federal Response Plan is applicable to (circle all that apply):

. a. Emergencies declared only at the local level.
   b. Hazardous materials accidents.
   c. Floods and fires.
   d. Radiological emergencies.

13. The President's denial of a request for an emergency declaration is final, with no right to appeal.

    a. True b. False

14. This facility, where the ERT is located, serves as the central coordinating facility for joint Federal-State operations.

    a. Regional Operations Center (ROC).
    b. Information and Planning Section (ESF-5).
    c. Emergency Operations Center (EOC).
    d. Disaster Field Office (DFO).

15. The major sections of the ERT at the DFO are Operations, Information and Planning, _____, and Administration.

    a. Finance.
    b. Community Relations.
    c. Logistics.
    d. Recovery.

16. The amount of home repair assistance provided under the Disaster Housing Program is based on the damages incurred, as determined by:

    a. The Preliminary Damage Assessment.
    b. The National Flood Insurance Program.
    c. The FEMA-State Agreement.
    d. A FEMA inspection.

17. Disaster Unemployment Assistance is funded by the Department of Labor.

    a. True b. False

18. The _____ (funded 75% by FEMA and 25% by the State) provides grants through a designated State agency to meet disaster-related serious needs and necessary expenses not covered by other Governmental assistance programs, insurance, or other means.

    a. Public Assistance Program.
    b. Hazard Mitigation Grant Program.
    c. Disaster Preparedness Improvement Grant Program.
    d. Individual and Family Grant Program.

19. Following a Presidential declaration of a major disaster for Individual Assistance, loans from the Small Business Administration (SBA) Disaster Loan program are available to (circle all that apply):

a. Homeowners and renters.
b. Municipal governments.
c. Business owners.
d. Nonprofit organizations.

20. Agricultural Assistance includes (circle all that apply):

a. Technical assistance.
b. Payments to farmers for emergency conservation.
c. Assistance in expediting farmers' income tax refunds.
d. Provision of farm equipment.

21. The _____ program provides assistance for repairs to or replacement of damaged structures and restoration of qualified public facilities.

a. Disaster Housing.
b. Public Assistance.
c. Infrastructure.
d. Minimal Repair.

22. _____ is any action taken to reduce the long-term risk to human life and property from natural hazards.

a. Preparedness.
b. Prevention.
c. Mitigation.
d. Disaster Resistance.

23. FEMA's _____ can fund up to 75% of the costs of qualified mitigation projects.

a. National Flood Insurance Program.
b. Performance Partnership Agreements.
c. National Fire Incident Reporting System.
d. Hazard Mitigation Grant Program.

24. Everyone in a participating community of the National Flood Insurance Program (NFIP) can buy flood insurance.

a. True b. False

25. In the absence of a Presidential disaster declaration, the _____ has authority to assist in flood-fighting and rescue operations and to repair certain flood-control works that are destroyed by a flood.

a. Coast Guard.
b. Public Works Emergency Support Function.
c. U.S. Army Corps of Engineers.

d. U.S. Forest Service.

26. A _____ is a dome or bulge of water that is caused by wind and pressure forces.

    a. Miniscus.
    b. Storm surge.
    c. Tidal wave.
    d. Tsunami.

27. Historically, the worst damage from hurricanes comes from coastal flooding caused by storm surge.

    a. True b. False

28. As a general rule, the threshold for potentially dangerous wind chill conditions is about _____.

    a. 12 degrees Fahrenheit
    b. 32 degrees Fahrenheit
    c. 20 degrees Fahrenheit
    d. –20 degrees Fahrenheit

29. Some hazards associated with thunderstorms include (check all that apply):

    a. Storm surges.
    b. Water spouts.
    c. Fires.
    d. Tornadoes.

30. In a flash flooding event, as little as _____ of moving water is enough to sweep a car into deeper flood waters.

    a. 1 foot.
    b. 6 inches.
    c. 3 feet.
    d. 2 feet.

31. Flash floods can be caused by (circle all that apply):

    a. Levee failure.
    b. Intense short-duration rainfall.
    c. Slow-moving thunderstorms.
    d. Snow/ice melt.

32. A seiche is likely to occur:

    a. In areas of dense vegetation.
    b. Along a lakefront.
    c. In sandy areas with high runoff potential.
    d. During times of heavy snowmelt.

33. Factors that affect the local severity, extent, and duration of coastal flooding include (circle all that apply):

    a. Downbursts.
    b. Tidal cycles.
    c. Stream runoff.
    d. Hail.

34. A Coastal Flood Watch includes information that clears part of the area that is no longer threatened.

    a. True b. False

35. Hazards associated with extratropical cyclones include (circle all that apply):

    a. Hurricanes.
    b. Heavy snow.
    c. Downbursts.
    d. Tornadoes.

36. In the Northern Hemisphere, intense tropical cyclones are called hurricanes, a term that echoes colonial Spanish and Caribbean Indian words for evil spirits and big winds.

    a. True b. False

37. Historically, the worst damage from hurricanes comes from inland flooding caused by torrnadoes spawned by the hurricane.

    a. True b. False

38. Hypothermia can occur when temperatures are above freezing.

    a. True b. False

39. Factors in the buildup of ground fog include (circle all that apply):

    a. Clear nights.
    b. Small temperature dewpoint spread.
    c. Cold surface air.
    d. Stable air (winds less than 5 m.p.h.).

40. If heat exhaustion is not treated, the body temperature may rise to _____ or more and heatstroke may occur.

    a. 103 degrees Fahrenheit.
    b. 100 degrees Fahrenheit.
    c. 104 degrees Fahrenheit.
    d. 105 degrees Fahrenheit.

41. Convective weather events occur most often:

a. During the late morning.
b. Mainly in late winter.
c. With late afternoon and evening thunderstorms.
d. When pressure gradients are extreme.

42. _____ occur mainly during the late winter and early spring when pressure gradients are extreme and soils are bare.

a. Snowstorms.
b. Wind storms.
c. Thunderstorms.
d. Flash floods.

43. Windstorms are usually most intense during the later afternoons and reintensify at night.

a. True b. False

44. The National Park Service manages firefighting activities on National Forest land.

a. True b. False

45. In the United States, most terrorist incidents have involved small groups seeking to achieve a designated objective.

a. True b. False

46. Factors in an earthquake's destructiveness include severity, geologic conditions, focal depth/distance from the epicenter, and _____.

a. Building design.
b. Early detection.
c. Rescue teams.
d. Resources deployed.

47. Tsunamis can travel up rivers and streams that lead to the ocean.

a. True b. False

48. Terrorism involving weapons of mass destruction refers to _____ _____weapons.

a. Automatic.
b. Maximum load bombing.
c. Technological.
d. Nuclear, biological, chemical.

49. First responders may be the targets of _____ at the scene of a weapons of mass destruction incident.

a. Threats.
b. Attacks.
c. Secondary devices.
d. Snipers.

50. The scene of a weapons of mass destruction attack will always be _____.

a. An international incident.
b. Caused by a nuclear device.
c. Sabotage.
d. A crime scene.